Lumen200/Lumen200S
Lumen200Pro

User Manual v1.2

Table of Contents

SECTION 1 IMPORTANT SAFETY INFORMATION 4

1.1 Important Safety Information 4
1.2 Safety Precautions 6
1.3 Shipping/Storage Precautions 8

SECTION 2 GENERAL INFORMATION 9

2.1 Lumen 200/S/Pro Specification 9
2.2 Lumen 200 9
2.3 Lumen 200S 9
2.4 Lumen200Pro 9
2.5 Liquid Light Guide Information 10

SECTION 3 LUMEN200 11

3.1 Identifying your System 11
3.2 Installing your System 12
3.2.1 Installing the Bulb 12
3.2.2 Connecting to the Microscope 15
3.3 Starting up the Lumen200 16
3.4 Working with the Lumen200 16
3.5 Shutting Down the Lumen200 17
3.6 When to Change the Bulb 17

SECTION 4 LUMEN200S 18

4.1 Identifying your System 18
4.2 Installing your System 19
4.2.1 Installing the Bulb 19
4.2.2 Connecting to the Microscope 22
4.2.3 Connecting your Lumen200S to a PC 23
4.2.3.1 Install the USB-Com port for Lumen200S in Windows 7 23
4.2.3.2 Install the USB-COM port for Lument200S in WindowsXP 23
4.2.4 Connecting your Lumen200S to an OptiScan or ProScan System 27
4.3 Starting up the Lumen200S 28
4.4 Working with the Lumen200S 28
4.4.1 Using a Lumen200S as a standalone Light Source 29
4.4.2 Using a Lumen200S with a PC only 29
4.4.3 Using a Lumen200S with a PC and OptiScan/ProScan Controllers 29
4.4.4 Using a Lumen200S with TTL Inputs 29
4.5 Shutting Down the Lumen200S 30

4.6 When to Change the Bulb 30

4.7 RS232 Command Set for Lumen200S 31
4.7.1 General Commands for the Lumen200S when connected to a PC 31
4.7.2 General Commands for the Lumen200S when connected via 32

SECTION 5 LUMEN200PRO 33

5.1 Identifying your System 33
5.2 Installing your System 34
5.2.1 Installing the Bulb 34
5.2.2 Connecting to the Microscope 37
5.2.3 Connecting your Lumen200Pro to an OptiScan or ProScan System 38
5.2.4 Connecting your Lumen200Pro to an Prior PCI Controller 39
5.3 Changing Filters in the Filter Wheel 40
5.4 Starting up the Lumen200Pro 42
5.5 Working with the Lumen200Pro 43
5.5.1 Using a Lumen200Pro as a standalone Light Source 43
5.5.2 Using a Lumen200Pro with a PC only 43
5.5.3 Using a Lumen200Pro with a PC and OptiScan/ProScan Controllers 43
5.6 Shutting Down the Lumen200Pro 43
5.7 When to Change the Bulb 44
5.8 RS232 Command Set for Lumen200Pro 45
5.9 Error Codes 51

SECTION 6 TROUBLESHOOTING 53

6.1 Alarms and Warnings 53
6.2 Troubleshooting 54

SECTION 7 REPLACEMENTS PARTS 57

SECTION 8 RETURNS AND REPAIRS 58

SECTION 1 IMPORTANT SAFETY INFORMATION

1.1 Important Safety Information.

- Use only as specified by the operating instructions or the intrinsic protection may be impaired.
- Keep this manual in a safe place as it contains important safety information and operating instructions.
- Before using the system, please follow and adhere to all warnings, safety and operating instructions located either on the product or in this User's Manual.
- **Do not** expose the product to water or moisture.
- **Do not** expose the product to extreme hot or cold temperatures.
- **Do not** expose the product to open flames.
- **Do not** allow objects to fall on or liquids to spill on the product.
- All of the Lumen variants are class 1 and **must only be** connected to a power outlet which provides a protective earth (ground).
- Connect the AC power cord only to designated power sources as marked on the product.
- Make sure the electrical cord is located so that it will not be subject to damage.

- Always disconnect power from product before connecting the components together.

- Use only the power supply cord set provided with the system for this unit, should this not be correct for your geographical area, contact your supplier.

- Do not in any way attempt to tamper with the product, doing so will void the warranty, and may damage the system. This product does not contain consumer serviceable components, all repairs or services should be performed by Authorised Service Centres, contact your local dealer for details.
- Ensure that the ventilations slots in the controller case are free from blockages.
- WARNING: - Hg-LAMP CONTAINS MERCURY, Manage in Accord with Disposal Laws.

- WARNING: The method in which the lamps are disposed of must comply with the local rules & regulations for disposal of hazardous materials. Lamps may be return to Prior Scientific providing they are return in their original packaging.
- Before replacing a fuse, DISCONNECT THE EQUIPMENT FROM THE MAINS SUPPLY.
- Ensure that the mains switch / IEC socket/ mains plug is easily accessible to allow the unit to be switched off.

Warnings:

- Eye damage may result from directly viewing the light produced by the lamp used in this product.

- Always make sure the light guide is properly inserted into the collimator which is firmly attached to the microscope using the adaptor provided and into the Lumen 200/Pro, before turning on the power to the unit.

Caution:

- Never look into the emitting end of a light guide. The light could severely damage the cornea and retina of the eye if the light is observed directly. Appropriate eye shielding must be used at all times; clothing should be used to protect exposed skin.

- Never place the end of an emitting light guide near skin as this may result in burning and damage to the skin.

- Never place the end of an emitting light guide near a flammable substrate as sufficient power is emitted from the light guide to ignite flammable substances.

1.2 Safety Precautions.

The Lumen 200 has protection features built in to avoid unintentional expose to UV radiation. In addition to this protection, please observe the following safety instructions.

Definitions of Labels:

Warning read instructions to determine possible hazard.

Caution: Read these operating instructions fully before use and pay particular attention to sections containing this symbol.

Use only as specified by the operating instructions or the intrinsic protection may be impaired.

Warning surface may be Hot

Warning UV Output

Danger Electrical Shock hazard.

Monitoring of the unit manual operation:

The level of energy supplied is sufficient to ignite flammable substances. During operation the unit must be attended at all times by a qualified operator. The unit must not be left unattended while left on. If an operator leaves the work area of the unit, the lamp power must be switched off.

1.3 Shipping/Storage Precautions.

- NEVER SHIP THE UNIT WITH THE BULB INSTALLED.
- Always use the original packaging for shipping and storing purposes.

Unpacking and Inspection

- Carefully unpack the unit and retain packaging to return equipment for servicing.
- If the equipment appears damaged in any way, return it to sales outlet in its original packaging. No responsibility for damage arising from the use of non-approved packaging will be accepted.
- Ensure all items and accessories specified are present. If not contact your local sales outlet.

Lumen 200 Standard Contents:

Lumen 200, Liquid Light Guide, Adaptor for specific microscope, Lumen 200 Bulb, Power Cord, Hex key.

Lumen 200S Standard Contents:

Lumen 200S, Liquid Light Guide, Adaptor for specific microscope, Lumen 200 Bulb, Power Cord, Shutter cable, RS-232 cable, USB cable, Hex key.

Lumen 200Pro Standard Contents:

Lumen 200Pro, Lumen 200/Pro Manual, Liquid Light Guide, Adaptor for specific microscope, Lumen 200 Bulb, Power Cord, Two Filter Wheel Cables, Shutter cable, Filter Wheel tool, Hex key.

SECTION 2 GENERAL INFORMATION

2.1 Lumen200 /S /Pro Specification.

Power: Universal integral Power Supply: Input 110-240V, 50/60Hz

Use within ambient temperature range: 18-28 ^{o}C.

Required clearance: 100mm minimum.

2.2 Lumen200.

The Lumen200 version of the Lumen series is a stand-alone standard unit and is furnished with a manual 6 position shutter, (0, 10, 25, 50, 75,and 100%). The Lumen200 contains a 200 Watt Metal halide bulb which is temperature controlled. The bulb is self-aligning and is coupled via special optics to the liquid light guide, which transfers the light to the microscope. For each major make of microscope an adaptor is available to connect the liquid light guide to the microscope.

2.3 Lumen200S.

The Lumen200S version of the Lumen series contains an integrated high speed shutter that can be controlled via the shutters ports of Prior ProScan and OptiScan controllers, USB, RS2323 or TTL. It can also operate as a stand-alone standard unit and is furnished with a manual 6 position shutter, (0, 10, 25, 50, 75, and 100%). The Lumen200S contains a 200 Watt Metal halide bulb which is temperature controlled. The bulb is self-aligning and is coupled via special optics to the liquid light guide, which transfers the light to the microscope. For each major make of microscope an adaptor is available to connect the liquid light guide to the microscope.

2.4 Lumen200Pro.

The Lumen200Pro version of the Lumen series contains a 6 position filter wheel and an advanced shutter (0-100% in 1% increments). The filter wheel and shutter require an external controller, it is recommended that this is either the Prior ProScan, PCI card, or the OptiScan II that will control these accessories. The Lumen200Pro contains a 200 Watt metal halide bulb which is temperature controlled. The bulb is self-aligning and is coupled via special optics to the liquid light guide, which transfers the light to the microscope. For each major make of microscope an adaptor is available to connect the liquid light guide to the microscope.

NOTE: To have manual control of the filter wheel, shutter and light attenuation of the

Lumen200Pro you must have a ProScanIII and a PS3J100 interactive joystick. The ProScanII and Optican can only control these features via software.

2.5 Liquid Light Guide Information.

Liquid light guides have a limited lifetime, independently of whether they are stored or in use. However, lifetime may vary depending on climatic conditions. Cold and humid environments will extend lifetime, hot and/or dry environments will shorten it. Though the outstanding UV performance will not markedly degrade during usage, we recommend that the light guide is replaced in advance of the expected lifetime of expiration. Final degradation is generally caused by the formation of bubbles in the liquid, and optical output may then drop very rapidly.

Approximate lifetime: 4 years

Suggested replacement time: 3 years

Figures based on 23^{o}C and 60% humidity.

General usage temperature range:

Min +5^{o}C/41^{o}F

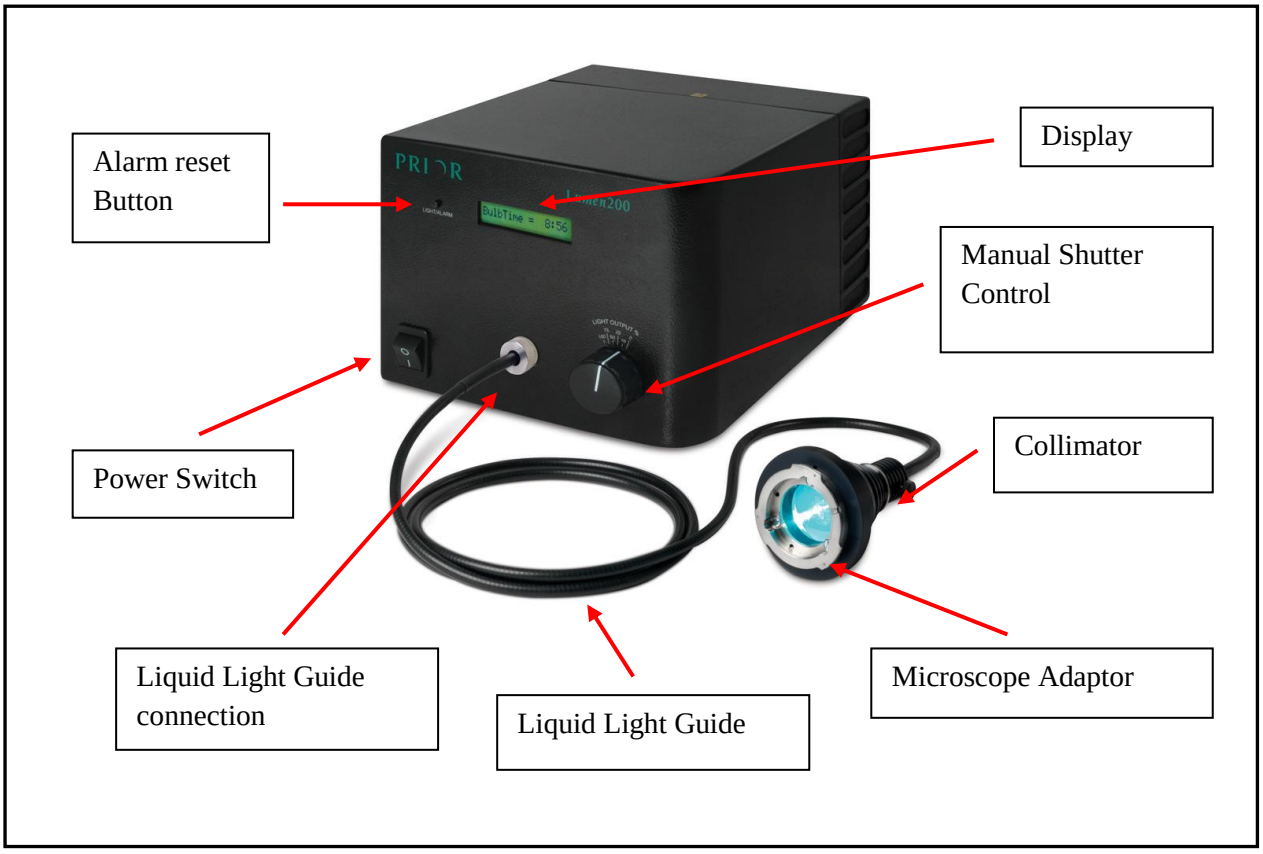
Max: +30^{o}C /+86^{o}F

Should the temperature limits be exceeded the likely damage is the formation of bubbles inside the liquid. These may be reabsorbed if the light guide is stored at room temperature for several days.

SECTION 3 Lumen200

3.1 Identifying your system.

The Lumen200:



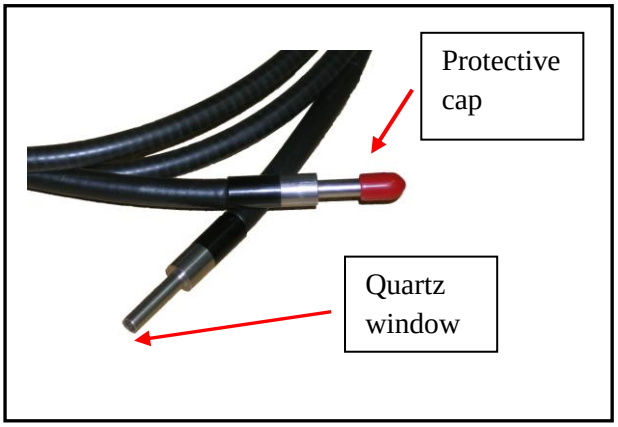


Fig 1 - The Liquid Light Guide

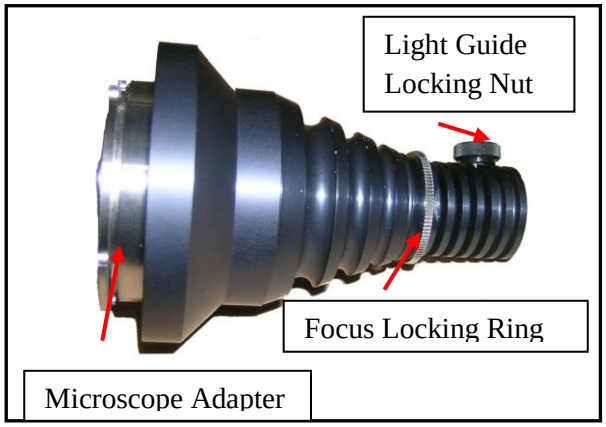


Fig 2 – Lumen Collimator & Adapter

3.2 Installing your system.

3.2.1 Installing the Bulb

Required equipment:

Lumen 200, Hex Key, Prior LM200B1-A Bulb

Warning:

- Only use Prior LM200B1-A bulbs, failure to do so may cause damage to the unit.
- **Do not** touch the inside of the reflector of the bulb.
- The bulb is delicate, handle with care.

Instructions:

1. Do not connect the unit to the mains supply. *(If the Lumen200 has been previously switched on, wait for 30 mins to allow bulb to cool).*
2. Find a flat surface and place the Lumen200 upside down on the surface.
3. Unscrew the four Hex screws and remove the panel, as indicated in Figure 3 below.

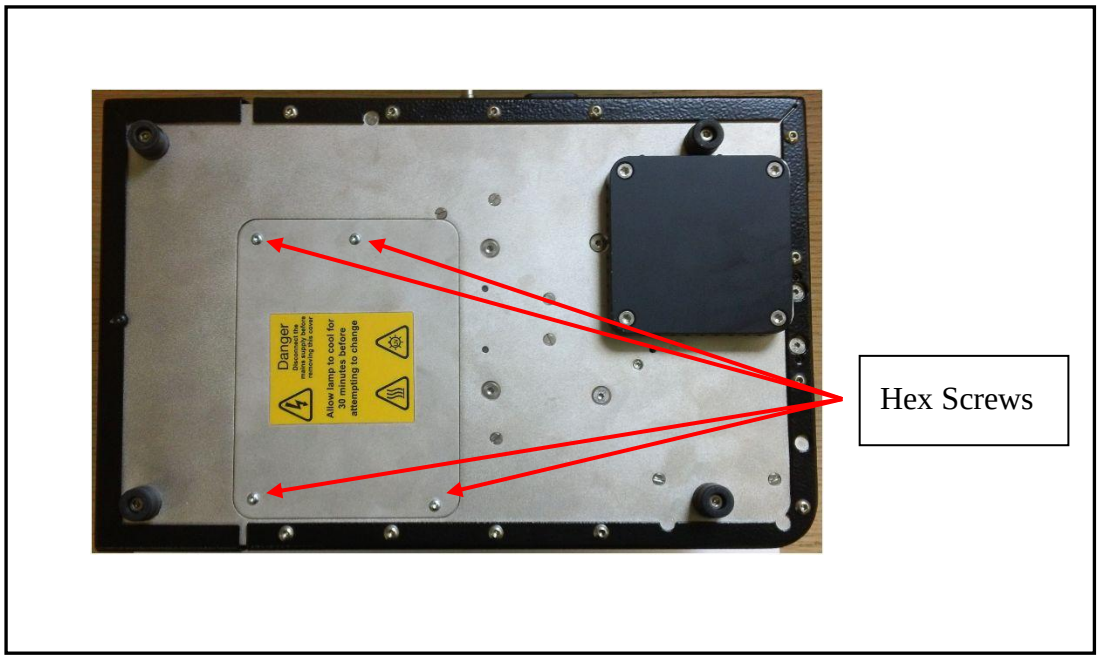


Figure 3 - Bulb Housing.

Remove bulb from Carton :

a. Open top of Carton

b. Remove V-shaped Cardboard Holder

c. Push Cardboard Flaps back

d. Lift bulb out of carton.

4. Turn the bulb so that the cables and connector hang down into the bulb chamber. Plug the brown connector on the bulb into power socket in bulb housing; ensure it is pushed firmly into position.

5. This will orientate the bulb with the PCB and data connector socket facing upwards (Fig 6).

6. Locate the bottom of the bulb (as indicated in Fig 5 into the groove in the bottom (lamp house clamp (Fig 4) of the lamp housing.

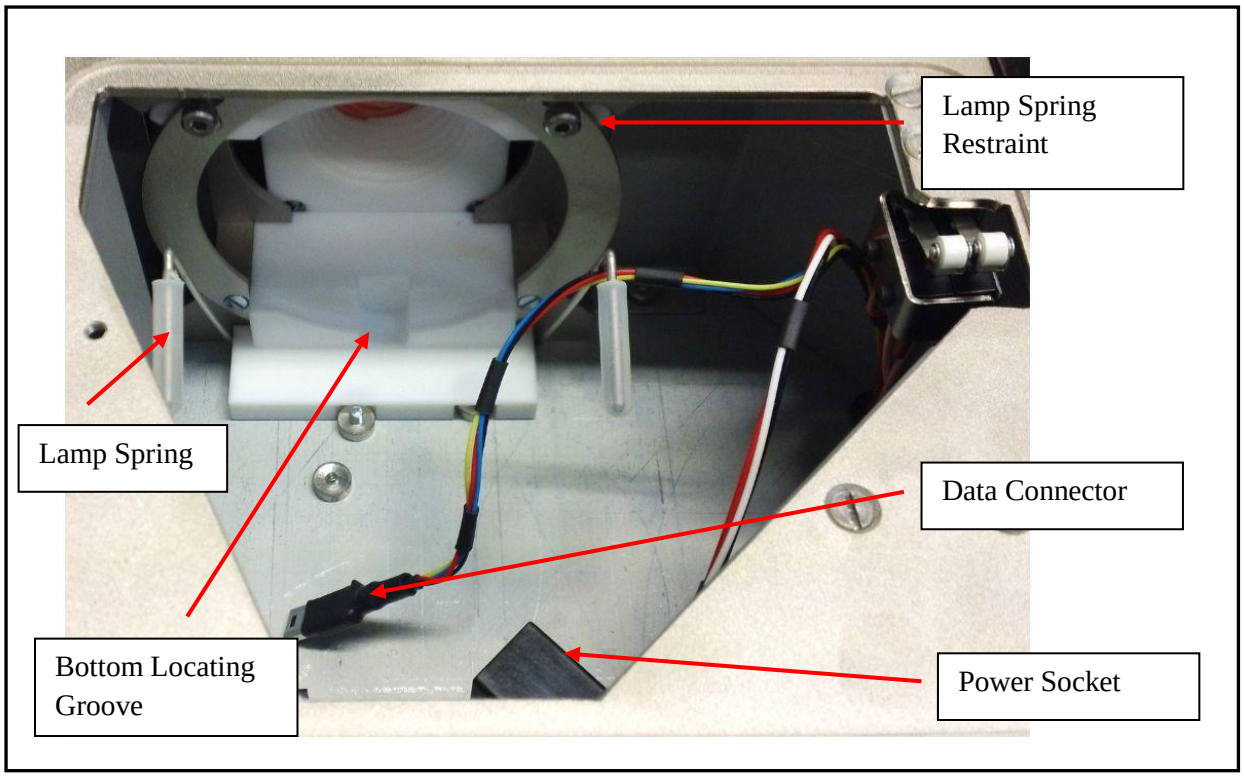


Fig 4 - The Bulb Housing Internals

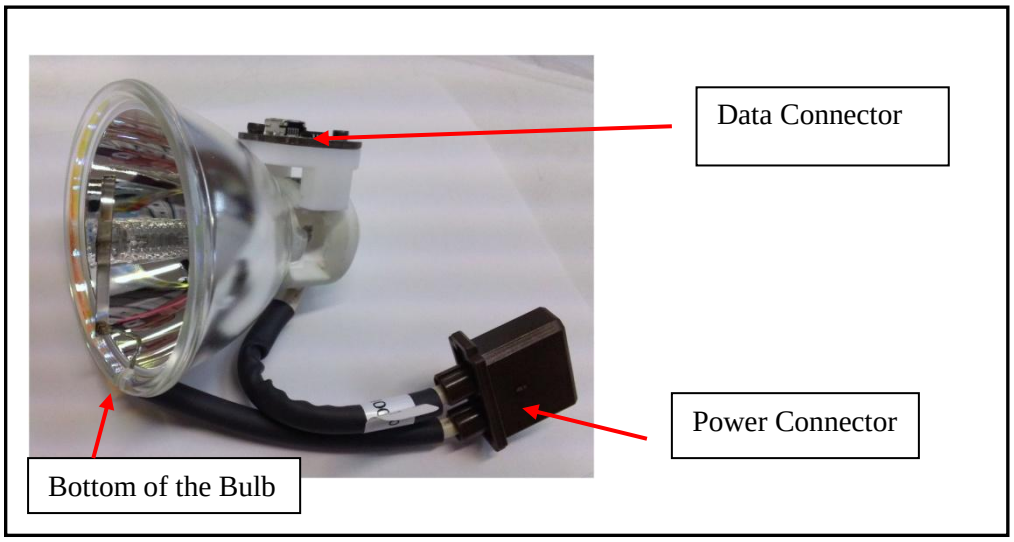


Fig 5 - The LM375 Bulb

7. Lift the spring towards the bulb, as you do so the bulb will be pushed into the correct position, click the springs all the way into the Lamp Spring Restraints. (see Fig 6).

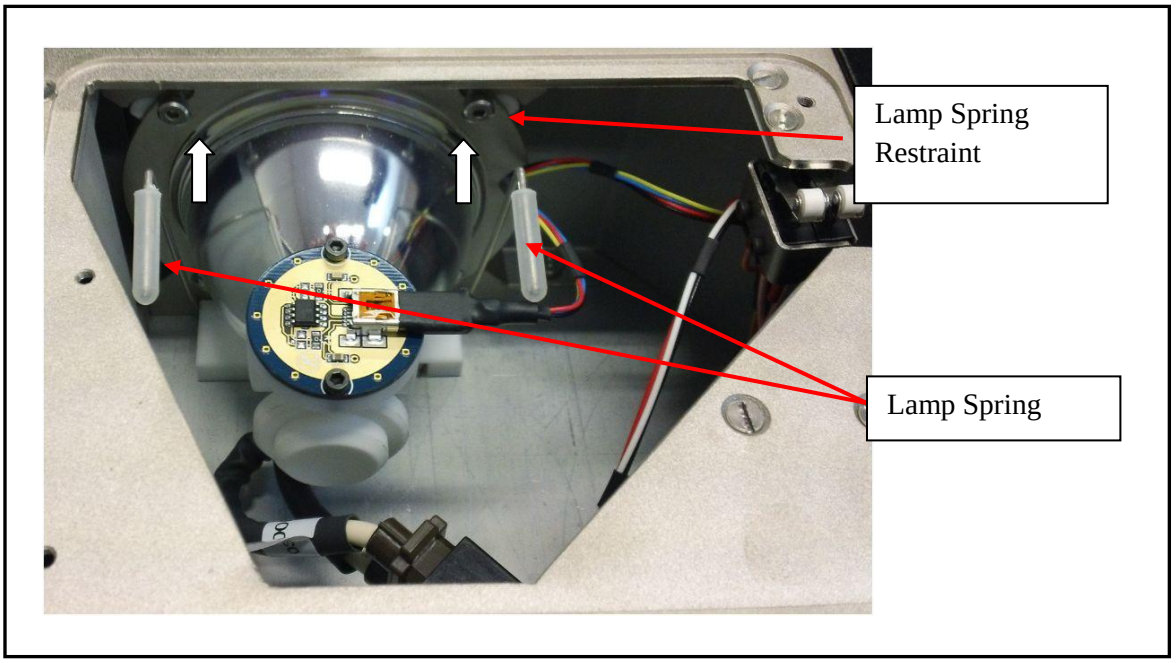


Fig 6: Lamp Spring Restraint.

8. The bulb is now firmly held vertically in place.
9. Plug Data connector into its socket on the PCB.
10. Replace the bulb housing cover and replace the four hex screws.

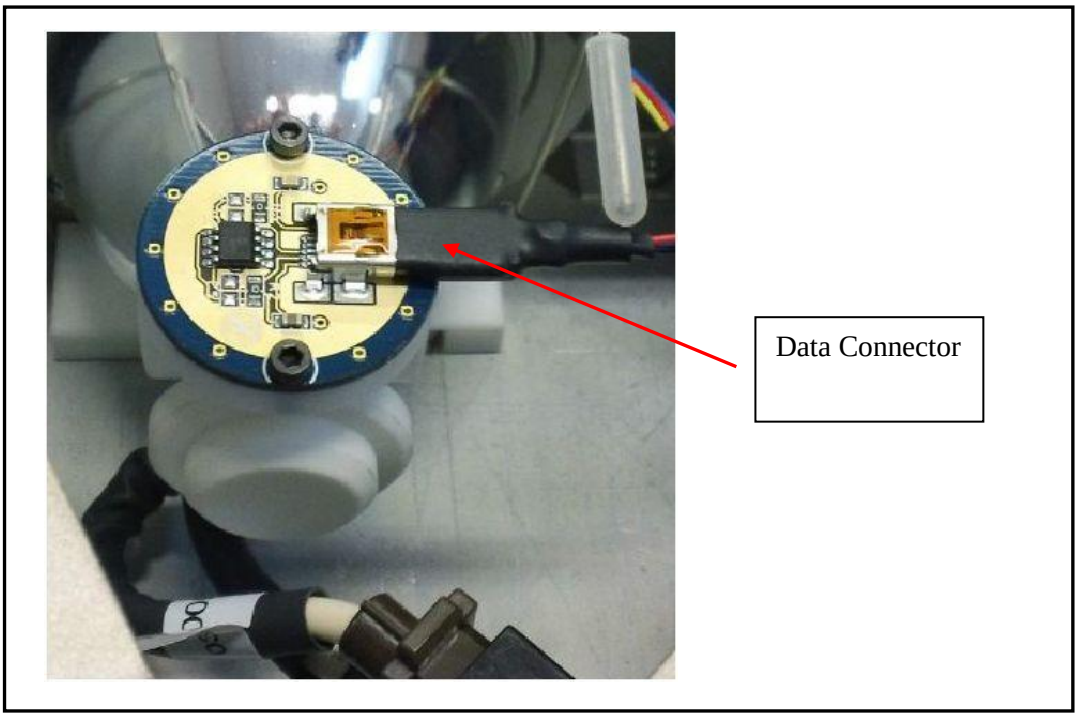


Fig 7 - The Data Connector

3.2.2 Connecting to the Microscope

Once the bulb is installed (see section 3.2.1), the Lumen200 is ready to be connected to the microscope.

1. Place the Lumen200 in a safe location and ensure none of the fan outputs are obstructed.
2. Unpack the liquid light guide from the foil packaging and remove both plastic caps from the light guide. Note: It is important to remove the caps before connecting to the light guide to avoid damage on power up.
3. Unscrew the connector on the front of the Lumen200, and insert the Light guide.
    a. Ensure the light guide is fully inserted into the Lumen200, the light guide should be inserted by 58mm.
4. Tighten the connector unit resistance is felt, the light guide is now firmly held in the Lumen200 connector.

5. Locate the collimating lens supplied to attach the light guide onto the microscope, loosen the screw on the back of the collimating lens. Firmly push the light guide into the hole ensuring it has reached it end stop and tighten the screw.
6. The Lumen is supplied with a collimating lens specifically designed to fit your microscope, the supplied collimating lens will only fit the specified make of microscope.
7. The illumination can be optimized by focusing the beam by adjusting the distance between the fibre tip and the microscope by unscrewing the collimator. The silver locking ring and then be used to fix the collimator into the optimum position (see Fig 2).

3.3 Starting Up the Lumen200

Warning:

- **Do not** power up the Lumen200 without the light guide attached to both the Lumen200 and microscope.
- Only power up the Lumen200 when it is installed on a level surface.

1. Ensure the light guide is attached to both the Lumen200 and microscope.
2. Connect the power cable to the Lumen200.
3. Switch the Lumen200 power switch on.
4. Allow approximately 5 minutes for light to reach operational temperature.
5. **Do not** power down the unit within 10 mins of power up. This may reduce the effective lifetime of the bulb.

3.4 Working with the Lumen200

The Lumen200 is a manual light source. Attenuation of the light can be achieved by use of the manual shutter control knob on the front of the unit. Illumination can be set to 0%, 10%, 25%, 50%, 75% or 100% (Fig 8). Turning the knob to the left increases the intensity and turning to the right decreases intensity.

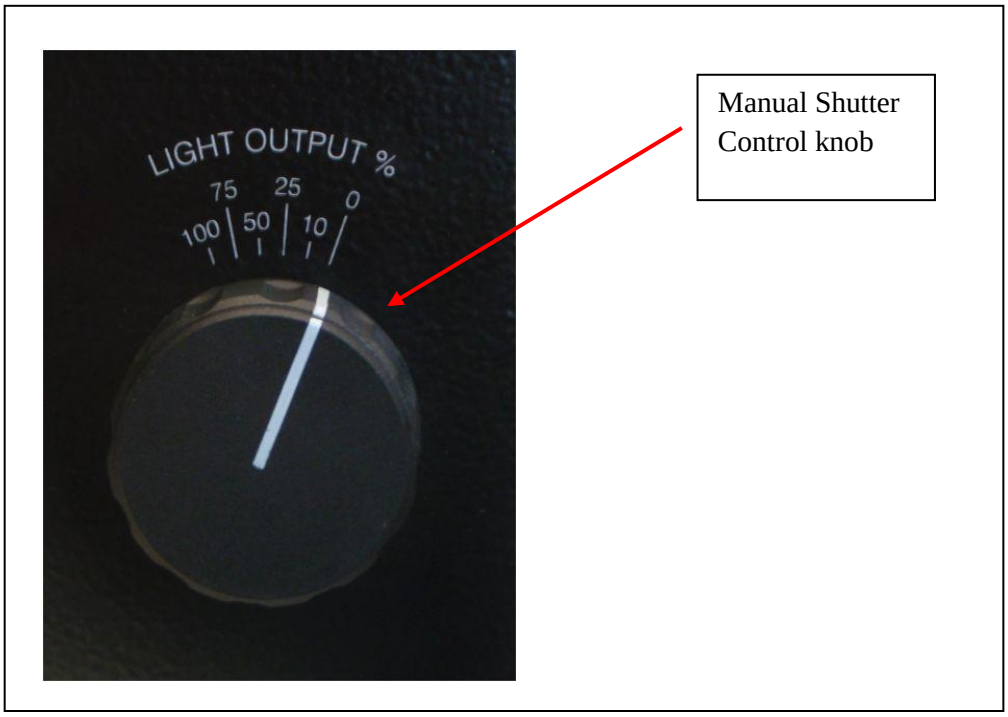


Fig 8 – Intensity Control Knob

3.5 Shutting down the Lumen200

The following warnings apply as damage to the bulb may result if instructions not followed.

Warning: Do not shut the unit down within 10 minutes of powering up the unit.

Warning: After shutting down the unit, allow 10 minutes before re-powering up or changing the bulb. Failure to do so is likely to result in damage to the bulb.

3.6 When to Change the bulb

The Lumen200 Bulb is installed with a timer chip which counts the hours that this specific bulb has been activated. Once the bulb reaches the recommended lifetime of 2000 hours, an alarm will sound on the Lumen200. It is recommended that the bulb is changed at this point.

This alarm can be silenced using the button situated to the left of the display panel on the front of the lumen. Once a bulb has reach 2000 hours the alarm will sound on power up of the Lumen200 until the bulb is changed.

SECTION 4 Lumen200S

4.1 Identifying your system.

Fig 9 - The Lumen200S:

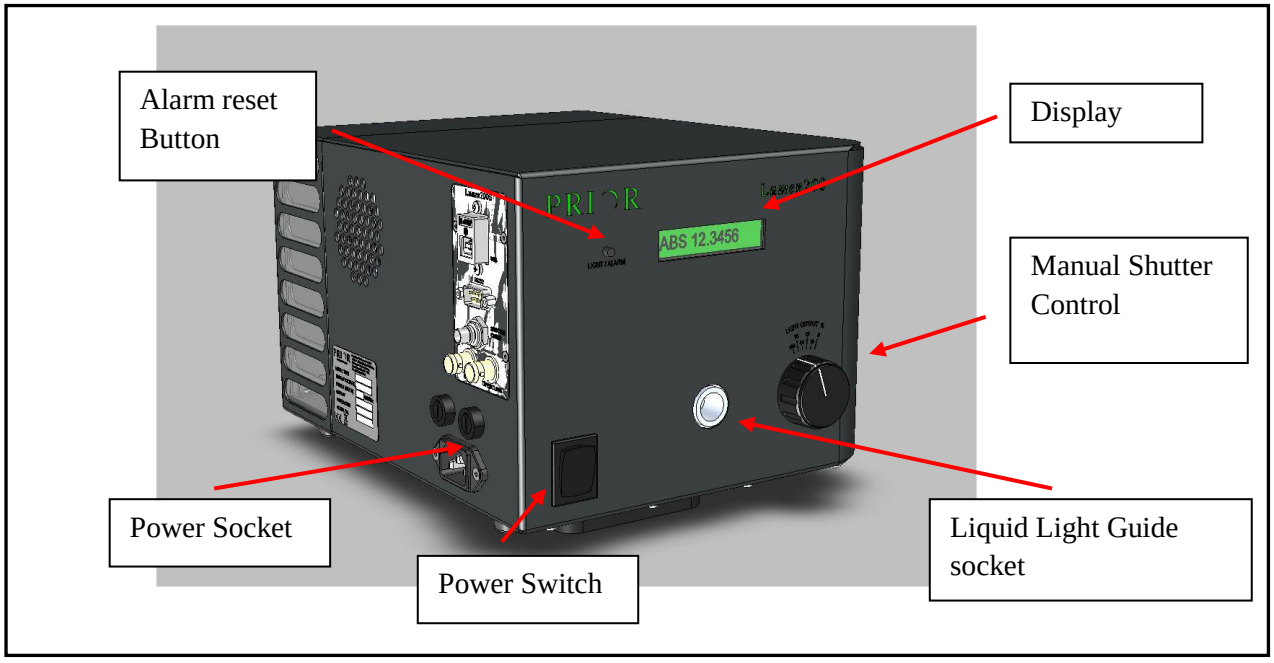
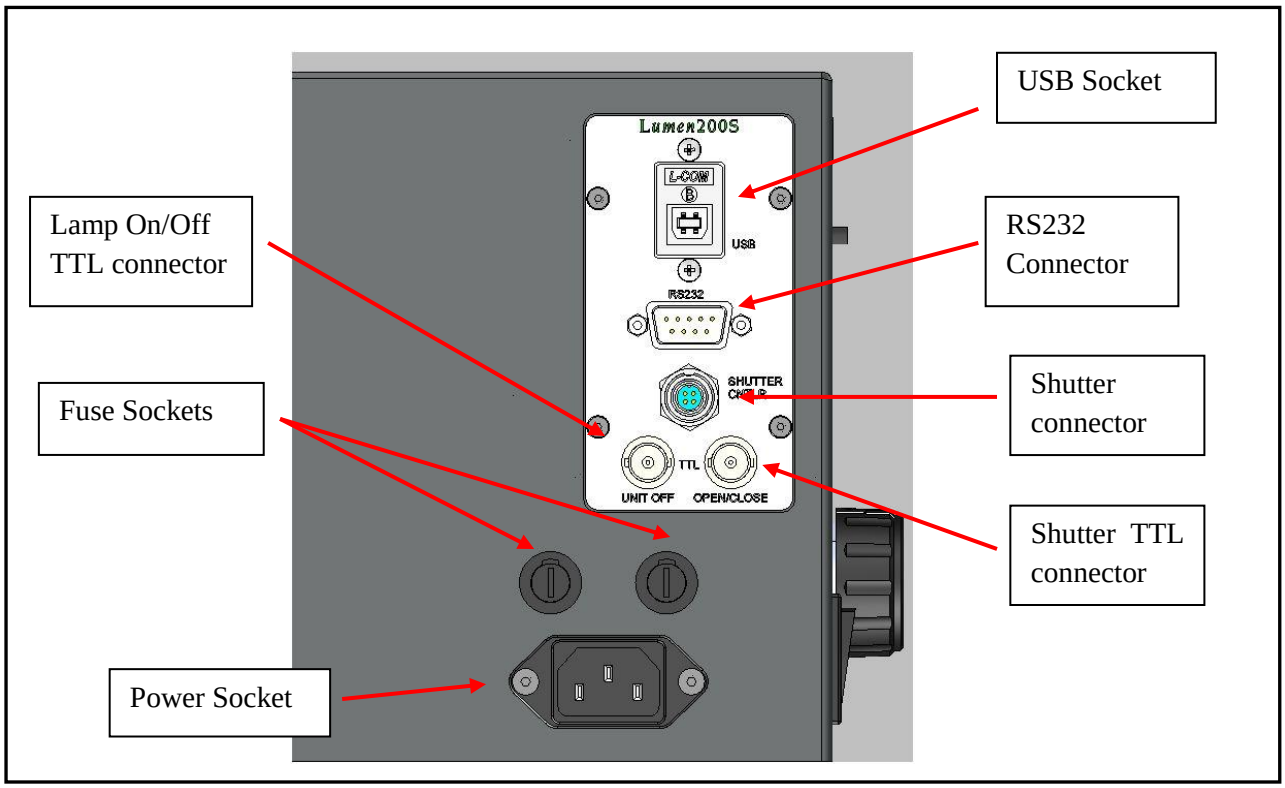


Fig 10 - The Lumen200S Side Panel



4.2 Installing your system.

4.2.1 Installing the Bulb

Required equipment:

Lumen200S, Hex Key, Prior LM200B1-A Bulb

Warning:

- Only use Prior LM200B1-A bulbs, failure to do so may cause damage to the unit.
- **Do not touch the inside of the reflector of the bulb.**
- The bulb is delicate, handle with care.

Instructions:

1. Disconnect the Lumen200S from the mains supply, *(If the Lumen200S has been previously switched on, wait for 30 mins to allow bulb to cool).*
2. Find a flat surface and place the lumen upside down on the surface.
3. Unscrew the four Hex screws and remove the panel, as indicated in Figure 11 below.

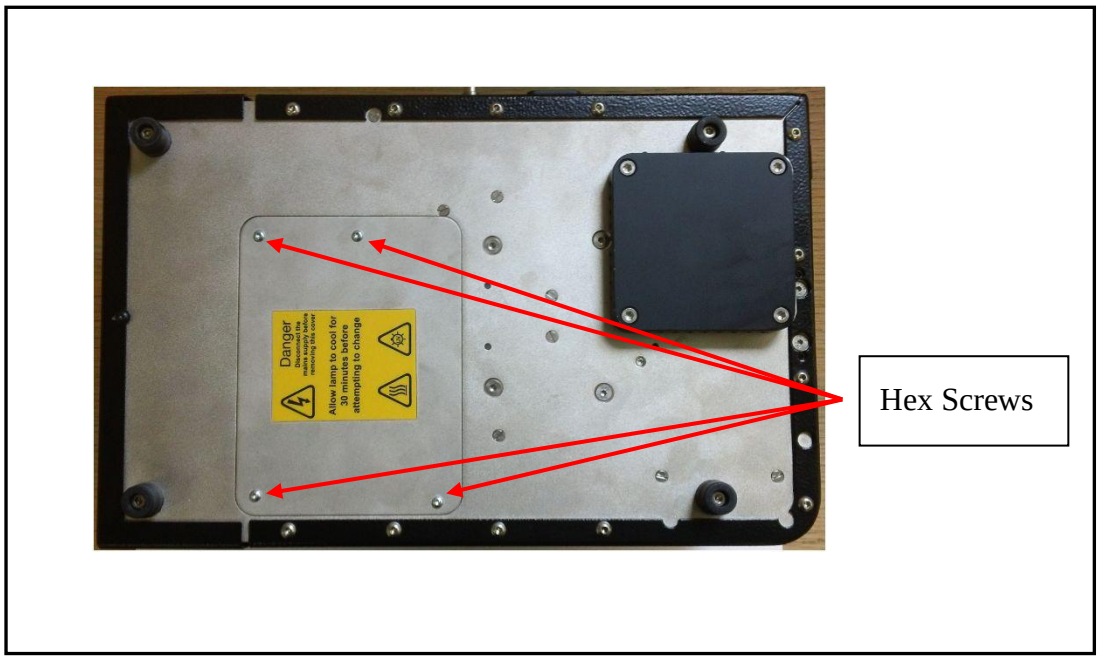


Fig 11- Bulb housing.

Remove bulb from Carton :

a. Open top of Carton

b. Remove V-shaped Cardboard Holder

c. Push Cardboard Flaps back

d. Lift bulb out of carton.

4. Turn the bulb so that the cables and connector hang down into the bulb chamber. Plug the brown connector on the bulb into power socket in bulb housing; ensure it is pushed firmly into position.

5. This will orientate the bulb with the PCB and data connector facing upwards.

6. Locate the bottom of the bulb (as indicated in figure 13 below) into the groove in the bottom (lamp house clamp Figure 12) of the lamp housing.

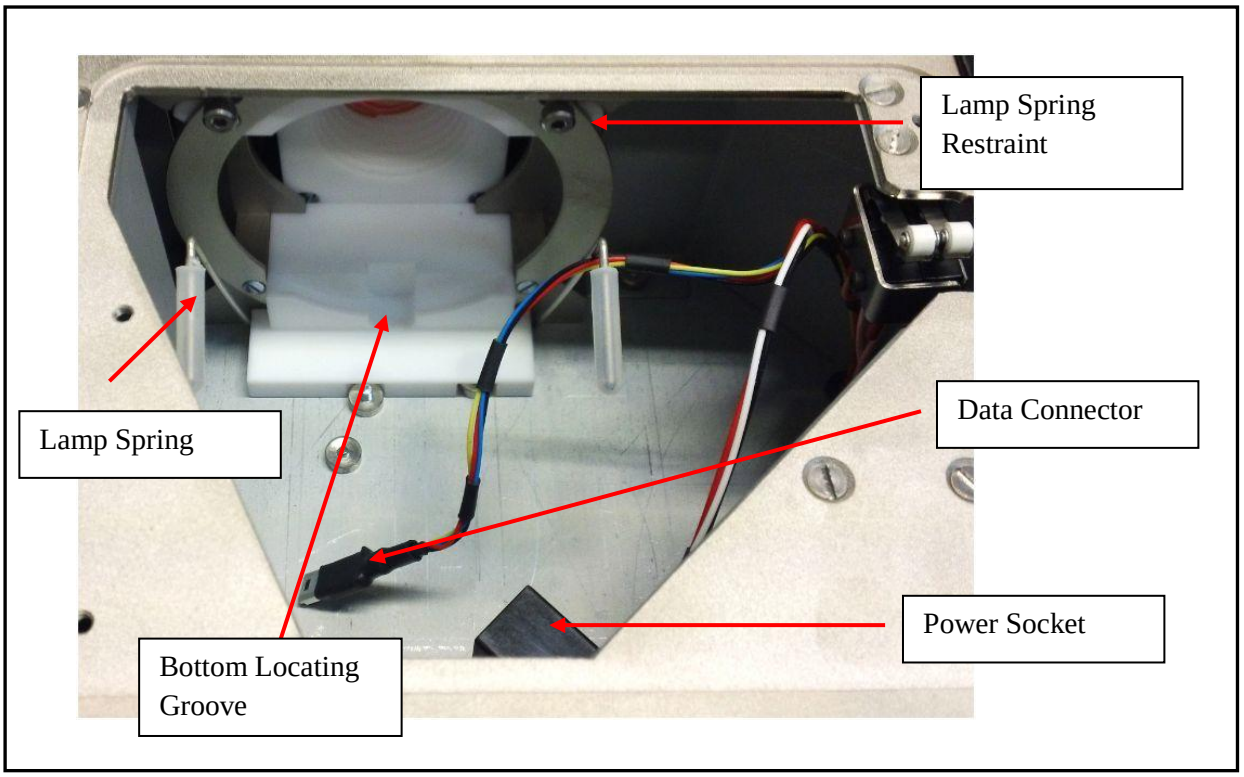


Figure 12 - Bulb Housing Internals.

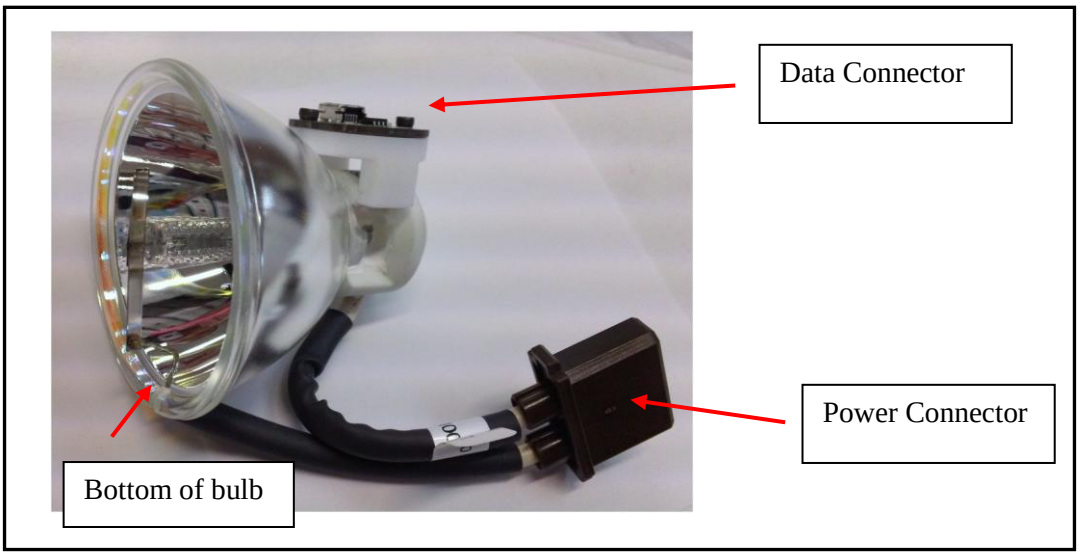


Fig 13 - The LM375 Bulb

7. Lift the spring towards the bulb, as you do so the bulb will be pushed into the correct position, click the springs all the way into the Lamp Spring Restraints. (see Figure 4.1e).

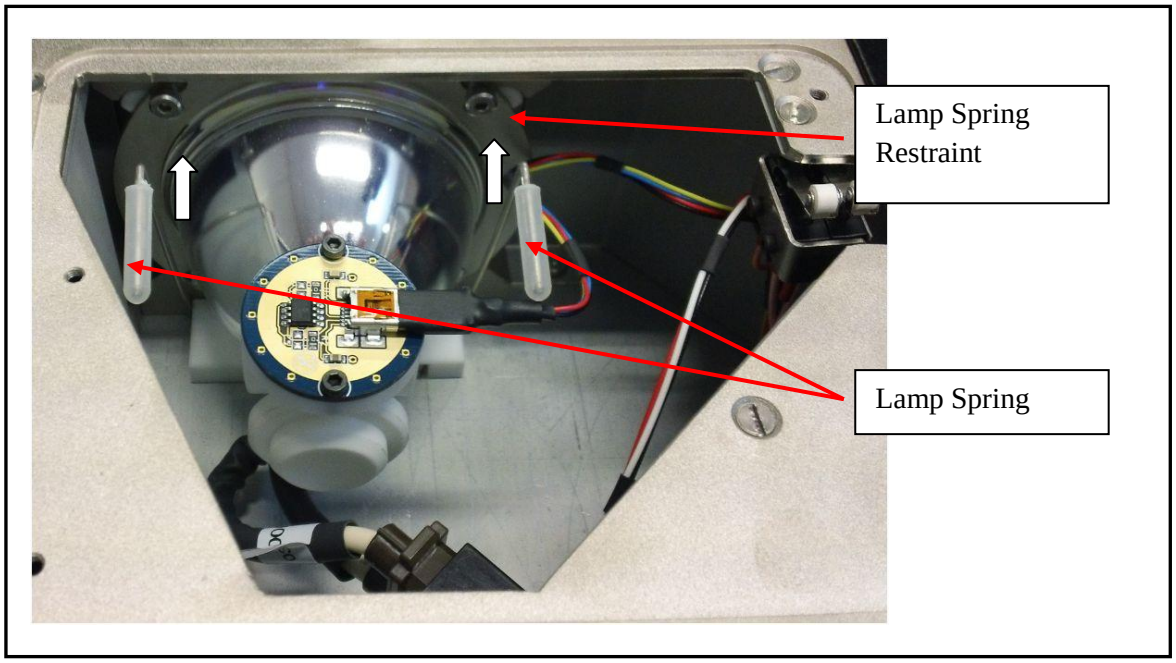


Fig 14 - The Lamp Spring Restraint

8. The bulb is now firmly held vertically in place.
9. Plug Data connector into socket on the PCB.
10. Replace the bulb housing cover and replace the four hex screws.

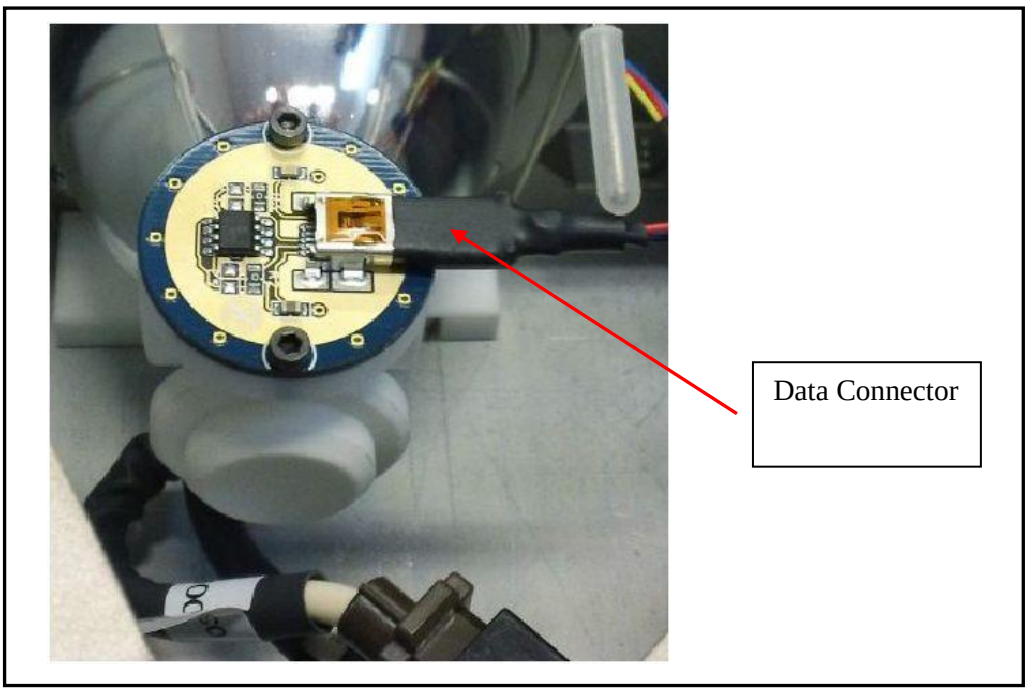


Fig 15 - The Data Connector

4.2.2 Connecting to the Microscope

Once the bulb is installed (see section 4.2.1), the Lumen200S is ready to be connected to the microscope.

1. Place the Lumen200S in a safe location and ensure none of the fan outputs are obstructed.
2. Unpack the liquid light guide from the foil packaging and remove both plastic caps from the light guide. Note: It is important to remove the caps before connecting to the light guide to avoid damage on power up.
3. Unscrew the connector on the front of the Lumen200S, and insert the Light guide.
    a. Ensure the light guide is fully inserted into the Lumen200S, the light guide should be inserted by 58mm.
4. Tighten the connector unit resistance is felt, the light guide is now firmly held in the Lumen200S connector.

5. Locate the collimating lens supplied to attach the light guide onto the microscope, loosen the screw on the back of the collimating lens. Firmly push the light guide into the hole ensuring it has reached it end stop and tighten the screw.

6. The Lumen is supplied with a collimating lens specifically designed to fit your microscope, the supplied collimating lens will only fit the specified make of microscope.

7. The illumination can be optimized by focusing the beam by adjusting the distance between the fibre tip and the microscope by unscrewing the collimator. The silver focus locking ring and then be used to fix the collimator into the optimum position. (See Fig 2)

4.2.3 Connecting your Lumen200S to a PC

The Lumen200S can be controlled directly from a PC without the need of an external controller such as an OptiScan or ProScan.

The Lumen200S will emulate a Prior Proscan controller with one shutter connected, and can be set up in 3rd party software this way.

The PC can be detected via USB or RS232 cable. If the USB cable requires a driver then please go the following section on the Prior Scientific website and download PL200/ES10ZE USB Drivers;

http://www.prior.com/downloadcentre/dc_software.html

4.2.3.1 Installing the USB-COM port for Lumen200S in Windows 7

Plug in the USB cable to the Lumen200S and the computer, power on the Lumen200S. Windows 7 should automatically recognize the device and install the appropriate drivers.

4.2.3.2 Installing the USB-COM port for Lumen200S in Windows XP

Plug in the USB cable to the Lumen200S and the computer, power on the Lumen200S.

When prompted select No, not at this time, then click NEXT.

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
< Back
Next >
Cancel

Fig 16

Select “Install from a list or specific location (advanced)”

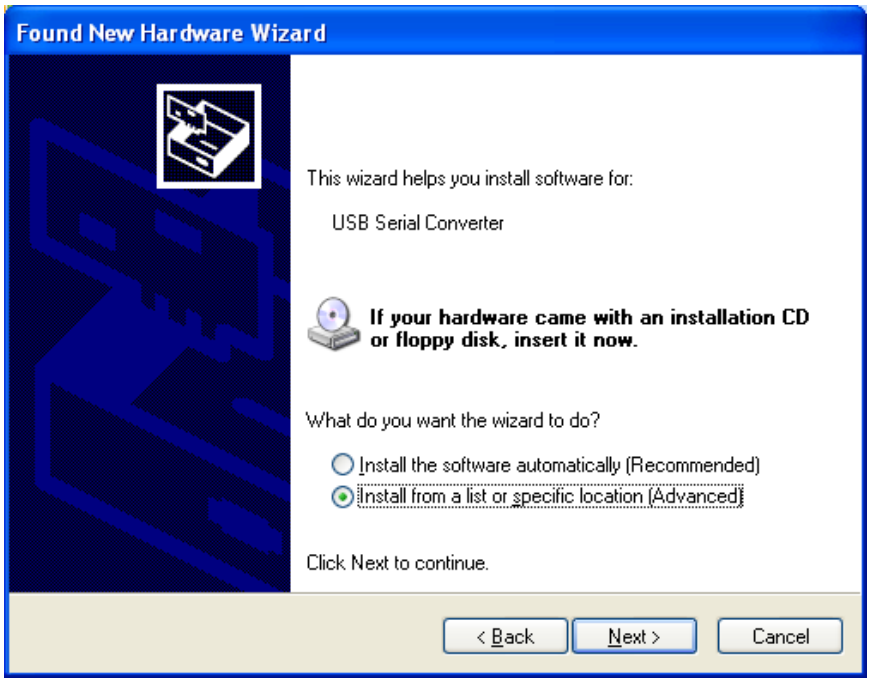

Found New Hardware Wizard
This wizard helps you install software for:
USB Serial Converter
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

Fig 17

Browse to the location of Eval232R, click NEXT.

Fig 18

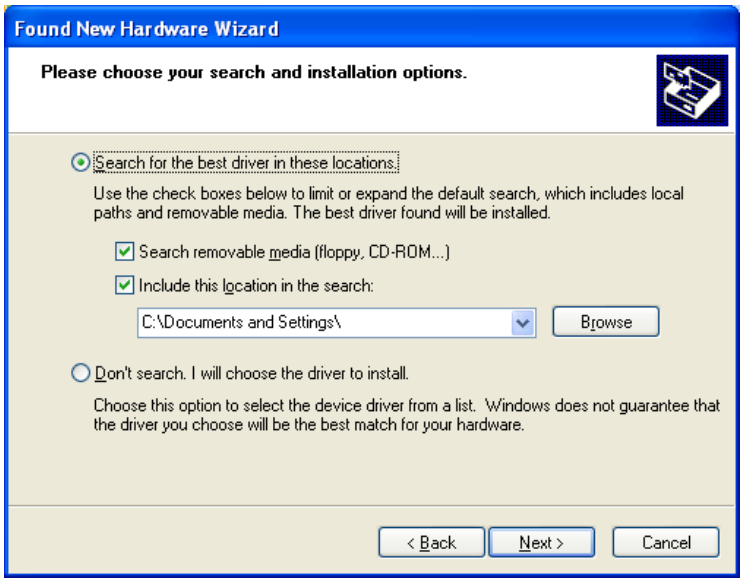

Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
C:\Documents and Settings\
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

Fig 19

The Eval232R folder can be found in the SDK. This can be downloaded from www.prior.com.

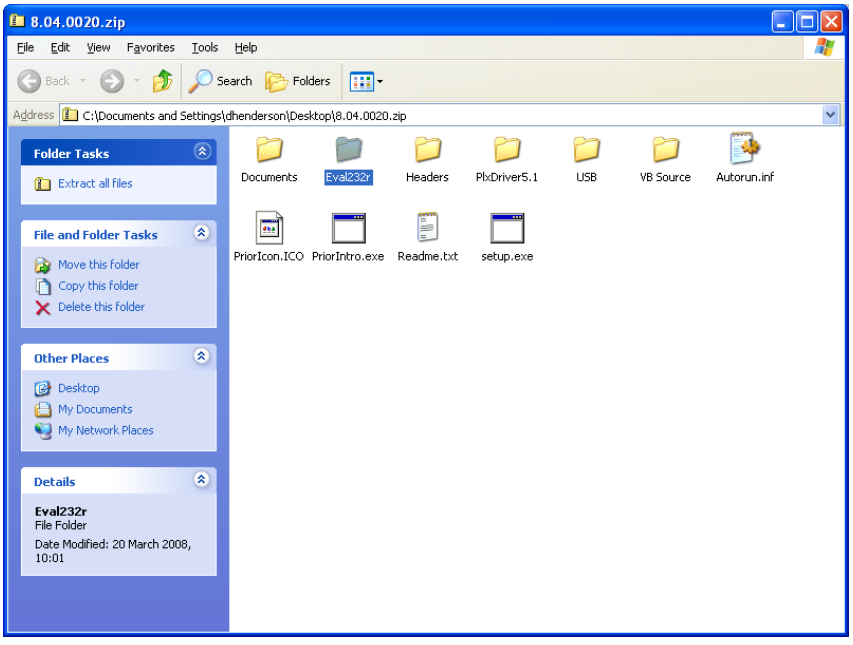


Fig 20

Contents of SDK.

Fig 21

Click Finish.

4.2.4 Connecting your Lumen 200S to an OptiScan or ProScan System

The Lumen 200S can work together with a Proscan or Optiscan controller assuming you have an active shutter connection, see Fig 22.

1. Connect Shutter Cntlr port on the Lumen200S to the Shutter port on the ProScan or OptiScan II system using the cables provided.

    a. It is not important which shutter ports are used on the Controller, but this should be noted for use with the command set described below, or for setting up your 3rd party software.

    b. Switch on the Controller, your Lumen 200S is now ready to accept commands.

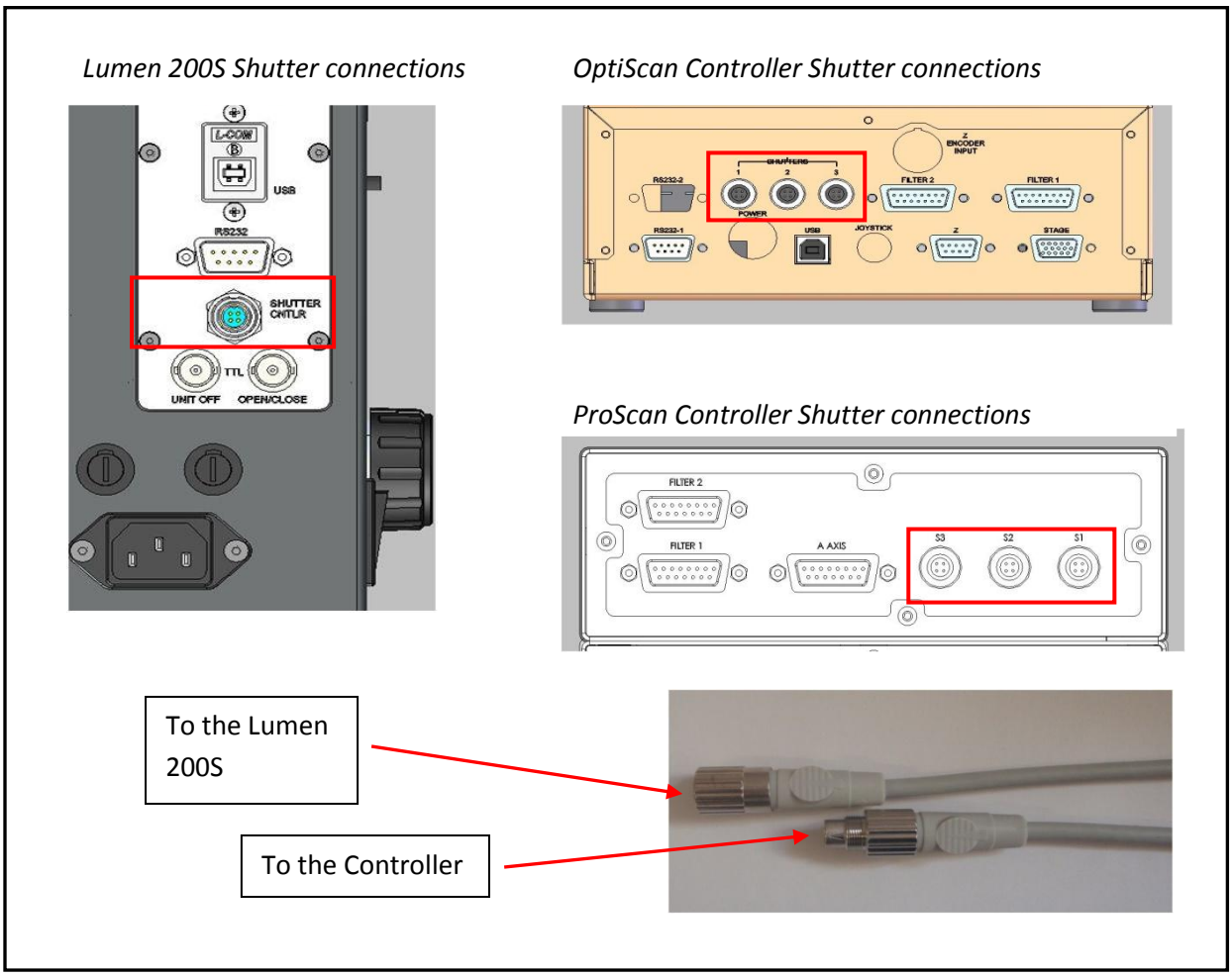


Fig 22 – The Lumen200S Connections

4.3 Starting Up the Lumen 200S

Warning:

Do not power up the lumen without the light guide attached to both the Lumen200S and Microscope. Only power up the Lumen200S when it is installed on a level surface.

1 Ensure the light guide is attached to both the Lumen200S and Microscope.

2 Connect the power cable to the Lumen200S.

3 Switch the Lumen power switch on.

4 Allow approximately 5 minutes for light to reach operational temperature.

5 **Do not** power down the unit within 10 mins of power up. This may reduce the effective lifetime of the bulb.

4.4 Working with the Lumen200S

The Lumen200S can use used either as a standalone unit, controlled directly though a PC or controlled by a PC via a Proscan III controller with a shutter connector. The condition of the shutter is indicated on the display panel on the front of the device (see Fig 23), along with the bulb on time in hours.

O = Shutter open. S = Shutter closed.

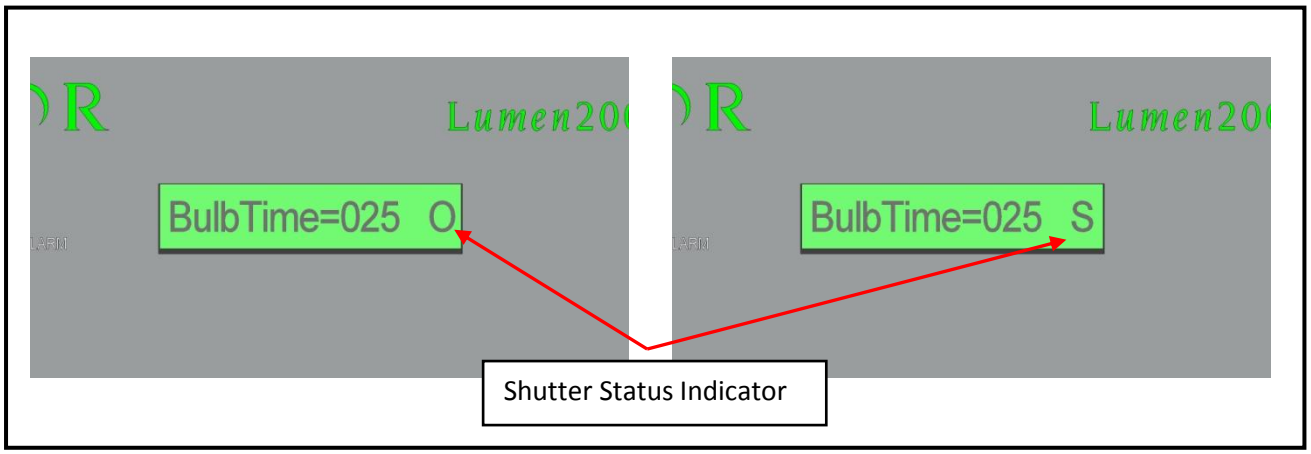


Fig 23 – Lumen200S Display Panel

4.4.1 Using a Lumen 200S as a standalone Light Source

By default the Lumen200S starts with the motorized shutter in the open position, you can hear the shutter opening upon start up. If the unit is used as a standalone device, then light intensity can be controlled manually with the control knob on the front of the unit. Turning the knob to the left increases the intensity and turning to the right decreases intensity.

4.4.2 Using a Lumen200S with PC only

The Lumen 200S shutter can be controlled via a PC, with the following direct connections; USB, RS232 and TTL. The Lumen200S behaves as a Proscan Controller with a single shutter, and can be set up in your software this way. See commands in section 4.7 RS232 command set for general commands for the Lumen 200S when connected directly to the PC. Alternatively refer to your software manual if you are controlling the Lumen200S with 3rd party software.

NOTE: Intensity can only be set using the manual shutter control knob on the front of the unit.

4.4.3 Using a Lumen200S with PC and OptiScan/ProScan Controllers

The Lumen200S shutter can be controlled via the OptiScan / Proscan controllers. Connect the Lumen200S to the shutter port of the Prior controller using a standard Prior shutter cable. The Prior controller can be controlled via the PC with either of the following connections, USB or RS232.

NOTE: Intensity can only be set using the manual shutter control knob on the front of the unit.

4.4.4 Using a Lumen200S with TTL Inputs

Two TTL inputs are available on the side panel of the Lumen200S.

The first of the TTL inputs can be used to OPEN or CLOSE the shutter. It uses 0V to 5vdc, were LOW is to OPEN the shutter and HIGH is to CLOSE the shutter.

The second of the TTL inputs can be used to turn OFF the bulb only. It uses 0v to 5vdc, were LOW is to turn OFF the bulb.

Note the Bulb cab only be turned back on by turning the mains switch OFF and ON again. The TTL can not be used to switch the bulb back ON.

4.5 Shutting down the Lumen200S

The following warnings apply as damage to the bulb may result if instructions not followed.

Warning: Do not shut the unit down within 10 minutes of powering up the unit.

Warning: After shutting down the unit, allow 10 minutes before re-powering up or changing the bulb. Failure to do so is likely to result in damage to the bulb.

4.6 When to Change the bulb

The Lumen200S Bulb is installed with a timer chip which counts the hours that specific bulb has been activated. Once the bulb reaches the recommended lifetime of 2000 hours, an alarm will sound on the lumen. It is recommended that the bulb is changed at this point.

This alarm can be silenced using the button situated to the left of the display panel on the front of the Lumen200S. Once a bulb has reach 2000 hours the alarm will sound on power up of the Lumen until the bulb is changed.

4.7 RS232 Command Set for Lumen200S

A description of how to connect to the ProScan or OptiScan systems is supplied in the OptiScan II and ProScan II manual. The following is the RS232 commands applicable to the Lumen 200Pro.

4.7.1 General Commands for the Lumen 200S when connected to the PC

Command	Arguments	Response (All end with <cr>)	Description
?	None	Text string	Reports information about the peripherals currently connected to the controller. The information end is always a line saying END This allows for the addition of extra fields of information without effecting application software. Users should always read lines in until the END is seen. A typical response is from Lumen 200S shown below PROSCAN INFORMATION DSP_1 IS NOT FITTED DSP_2 IS 3 AXIS STEPPER VERSION 0.0 DRIVE CHIPS 111000 JOYSTICK NOT FITTED STAGE = NONE FOCUS = NONE FOURTH = NONE FILTER_1 = NONE FILTER_2 = NONE SHUTTERS = 001 LED = 0000 AUTOFOCUS = NONE VIDEO = NONE HARDWARE REV A END
VER	None	Text String	Returns the version of the code fitted to the unit Eg. LumenShutter V2.5c
VERSION	None	Text string	Returns the Issue number. Eg. 025

BULBTIME	None	Text string	Returns the bulb lifetime as shown below; HOURS = 20 MINUTES = 30 END Showing bulb lifetime of 20 hours and 30 minutes.
UNIT	None	Text String	Returns the status of the Lumen200S UNIT = 1 UNIT = O END END For Bulb ON For Bulb OFF
UNIT	0	R	Turns the bulb OFF. It returns a response R on completion. NOTE:- The bulb can only be turned on again by turning the mains switch OFF and ON again.
8	S,C	R If shutter is not fitted E,20 will be returned	Opens or closes the shutter S If C is 0 the shutter is opened, If C is 1 the shutter is closed. eg 8,1,0 the shutter is closed
8	S	0,1	Returns the status of shutter S 0 the shutter is opened, 1 the shutter is closed.

4.7.2 General Commands for the Lumen 200S when connected via OptisScan / ProScan Controllers

Command	Argument s	Response (All end with <cr>)	Description
8	s,c[,t]	R If shutter s is not fitted E,20 will be returned	Opens or closes the shutter s (value '1' '2' or '3'), if c is 0 the shutter is opened, 1 it is closed. The optional argument t is used to open/close the shutter for a time t milliseconds.
8	s	c If shutter s is not fitted E,20 will be returned	Returns status c of shutter s
Shutter	s	Text string	Prints information about shutter's' (s is a value between 1 and 3). The information end is always a line saying END. This allows for the addition of extra fields of information without effecting application software. Users should always read lines until the END is seen in order to maintain compatibility. Example SHUTTER_1 = NORMAL DEFAULT_STATE=CLOSED END SHUTTER_2=NONE END

SECTION 5 Lumen200PRO

5.1 Identifying your system.

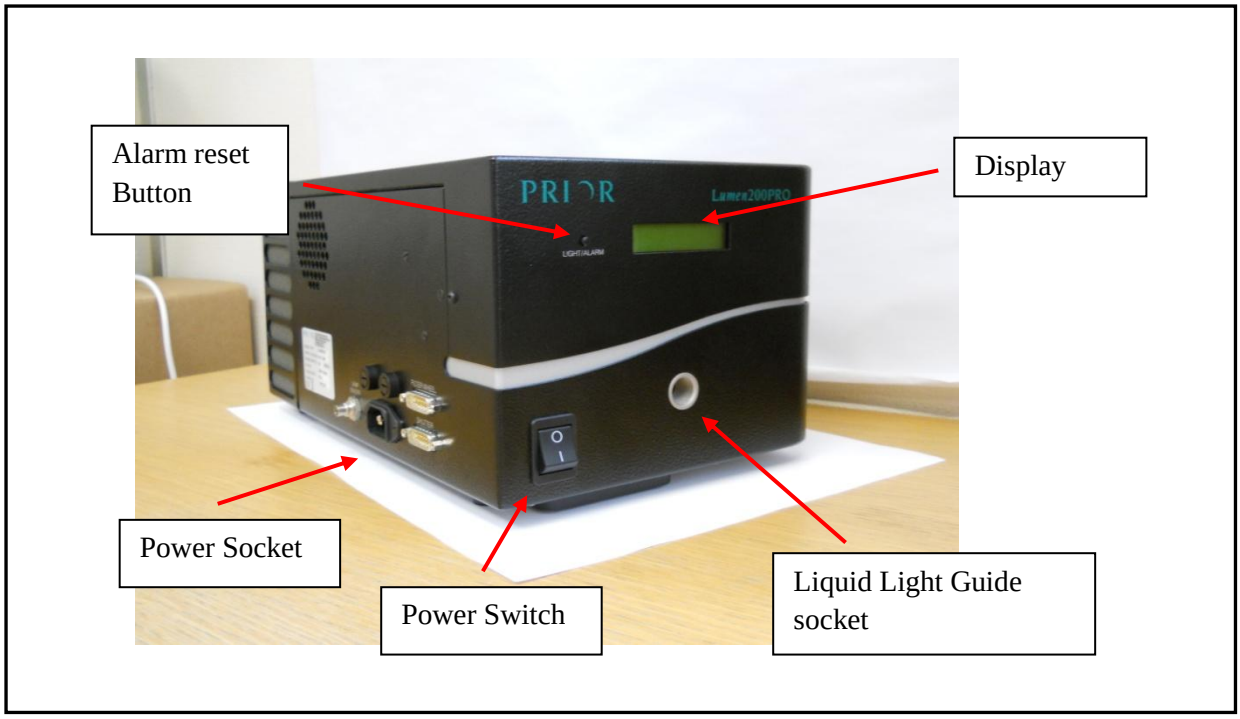


Fig 24 – The Lumen200Pro

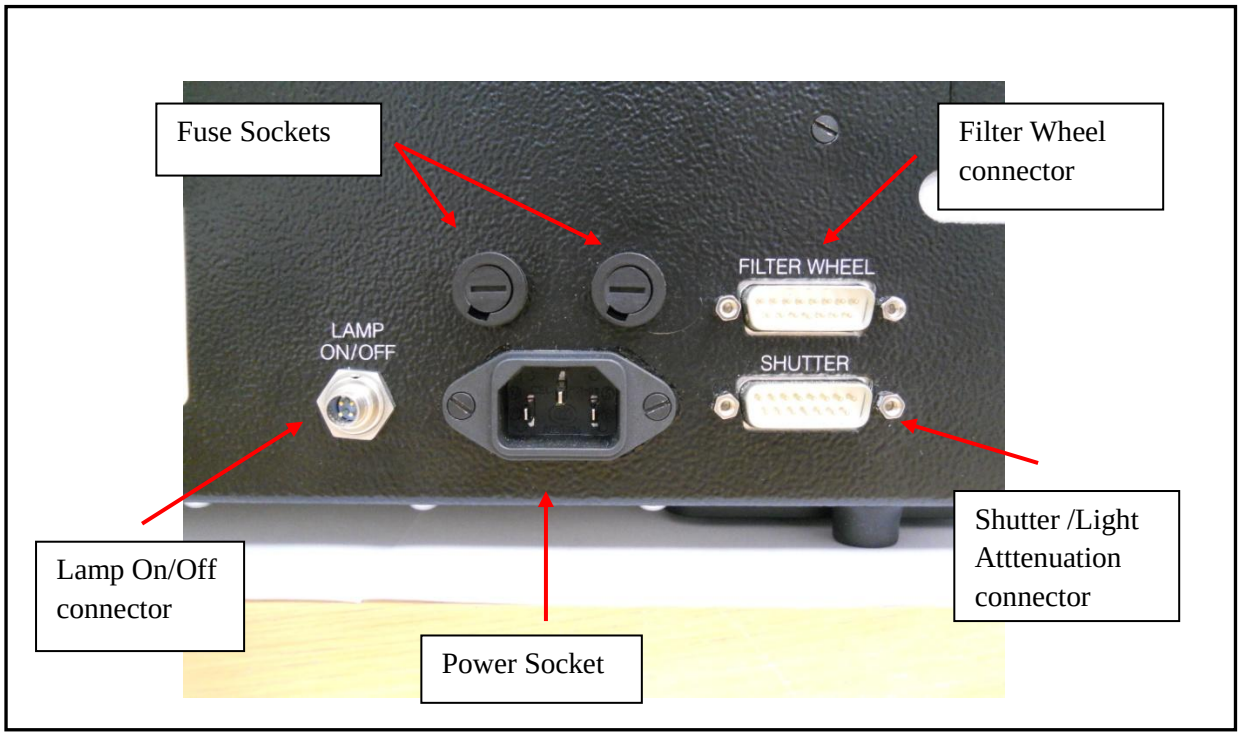


Fig 25 – The Lumen200Pro Side Panel

5.2 Installing your system.

5.2.1 Installing the Bulb

Required equipment:

Lumen200Pro, Hex Key, Prior LM200B1-A Bulb

Warning:

- Only use Prior LM200B1-A bulbs, failure to do so may cause damage to the unit.
- **Do not** touch the inside of the reflector of the bulb.
- The bulb is delicate, handle with care.

Instructions:

8. Disconnect the Lumen200Pro from the mains supply, *(If the lumen has been previously switched on, wait for 30 mins to allow bulb to cool).*
9. Find a flat surface and place the lumen upside down on the surface.
10. Unscrew the four Hex screws and remove the panel, as indicated in Figure 26 below.

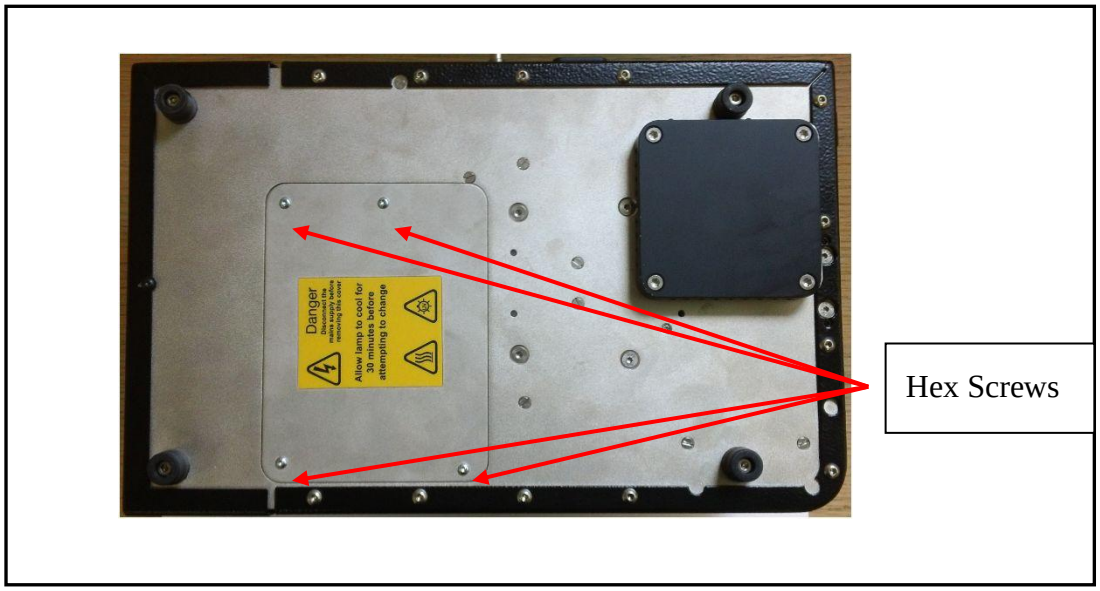


Figure - 26 Bulb housing.

Remove bulb from Carton :

a. Open top of Carton

b. Remove V-shaped Cardboard Holder

c. Push Cardboard Flaps back

d. Lift bulb out of carton.

11. Turn the bulb so that the cables and connector hang down into the bulb chamber. Plug the brown connector on the bulb into power socket in bulb housing; ensure it is pushed firmly into position.

12. This will orientate the bulb with the PCB and data socket facing upwards.

13. Locate the bottom of the bulb (as indicated in figure 28 below) into the groove in the bottom (lamp house clamp Figure 27) of the lamp housing.

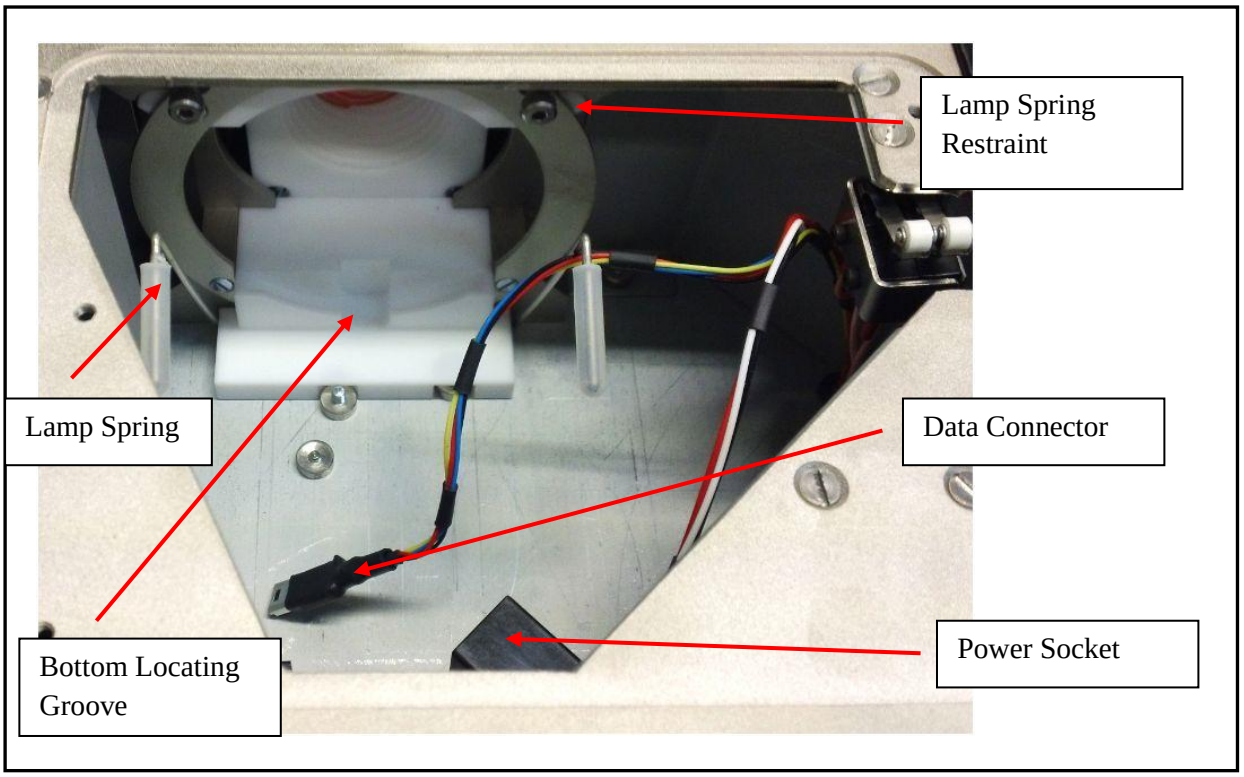


Fig 27 – The Bulb Housing Internals

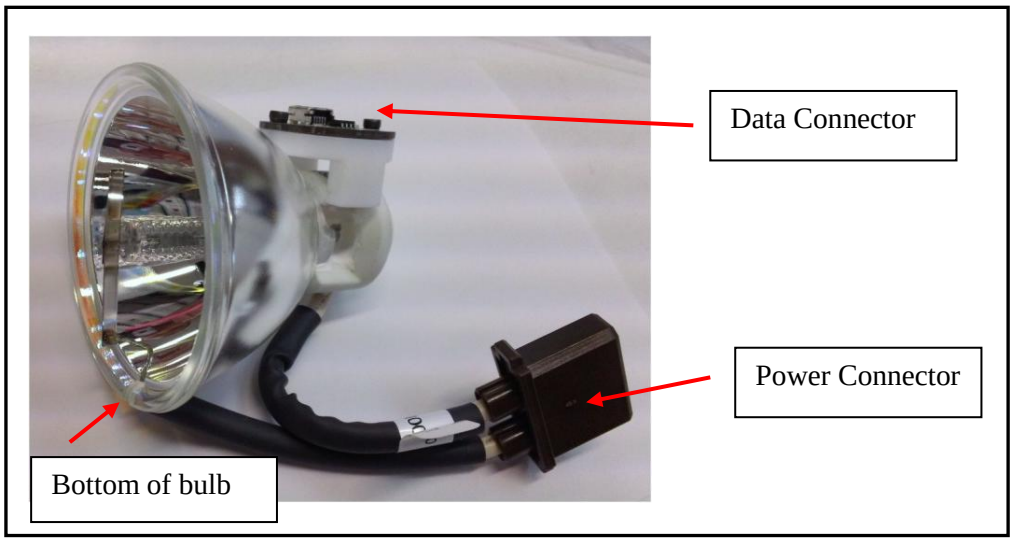


Fig 28 – The LM375 Bulb

14. Lift the spring towards the bulb, as you do so the bulb will be pushed into the correct position, click the springs all the way into the Lamp Spring Restraints. (See Figure 29).

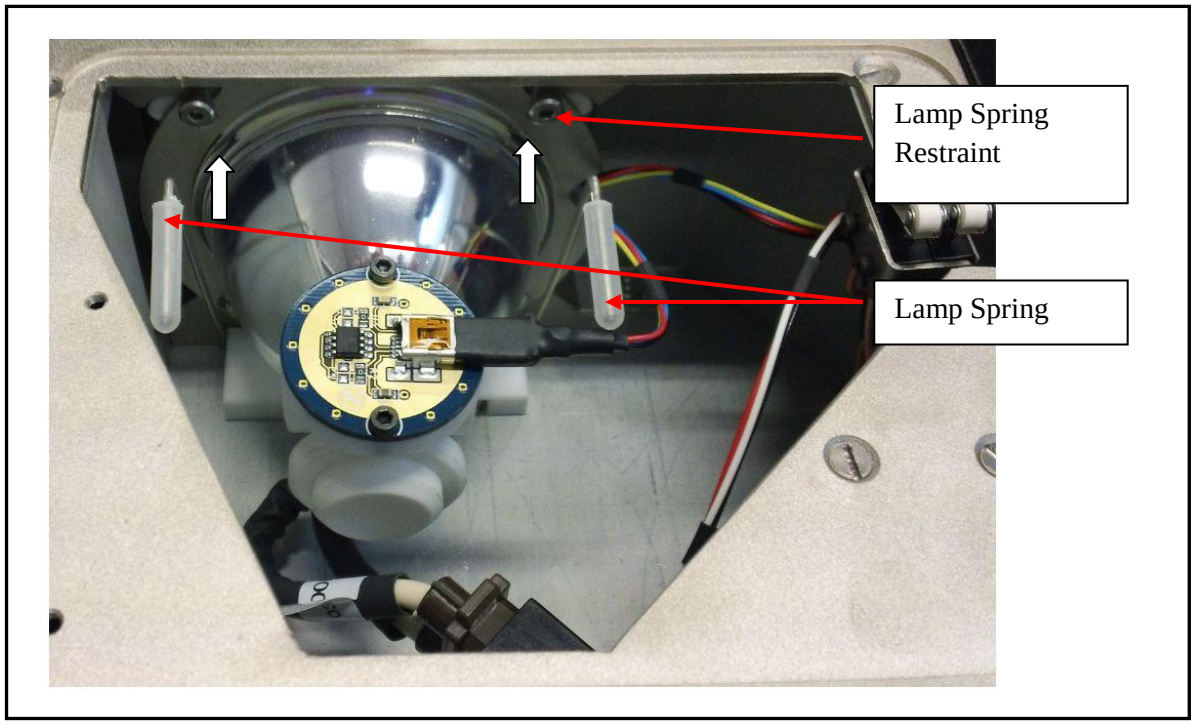


Fig 29 – The Lamp Spring Restraint

15. The bulb is now firmly held vertically in place.

16. Plug Data connector into its socket on the PCB.

17. Replace the bulb housing cover and replace the four hex screws.

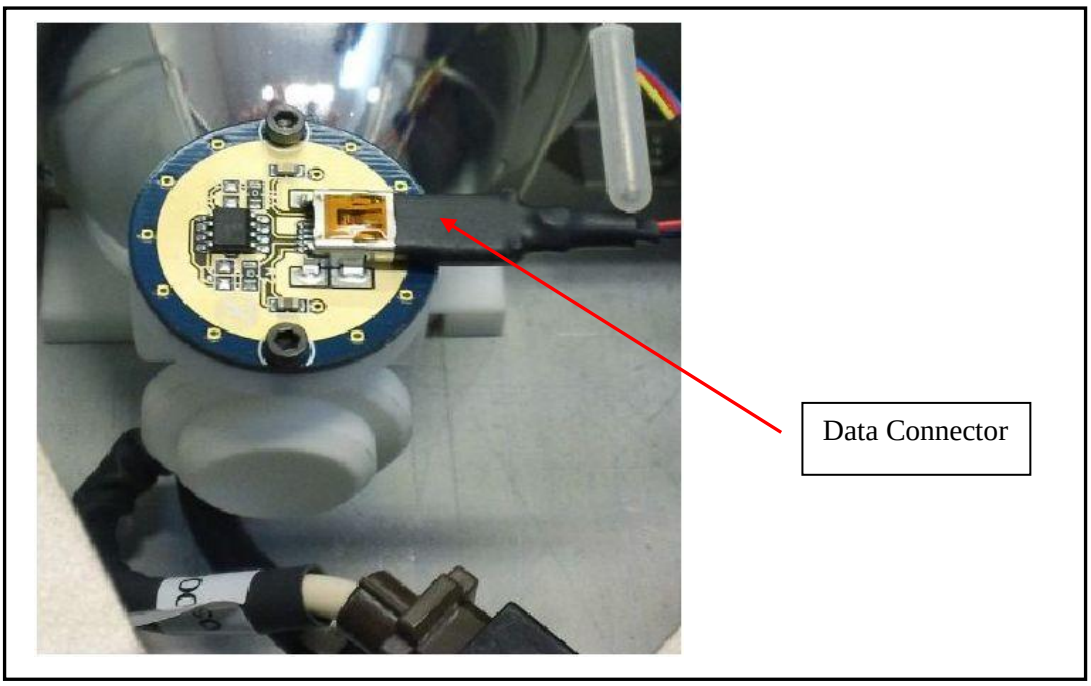


Fig 30 – The Data Connector

5.2.2 Connecting to the Microscope

Once the bulb is installed (see section 5.2), the Lumen200Pro is ready to be connected to the microscope.

1. Place the Lumen200Pro in a safe location and ensure none of the fan outputs are obstructed.
2. Unpack the liquid light guide from the foil packaging and remove both plastic caps from the light guide. Note: It is important to remove the caps before connecting to the light guide to avoid damage on power up.
3. Unscrew the connector on the front of the Lumen200Pro, and insert the Light guide.
    a. Ensure the light guide is fully inserted into the Lumen200Pro, the light guide should be inserted by 58mm.
4. Tighten the connector unit resistance is felt, the light guide is now firmly held in the Lumen200 Pro connector.
5. Locate the collimating lens supplied to attach the light guide onto the microscope, loosen the screw on the back of the collimating lens. Firmly push the light guide into the hole ensuring it has reached it end stop and tighten the screw.
    a. The Lumen200Pro is supplied with a collimating lens specifically designed to fit your microscope, the supplied collimating lens will only fit the specified make of microscope.

5.2.3 Connecting your Lumen200Pro to a OptiScan or ProScan System

The Lumen200Pro requires two filter wheel connections to a ProScan II or OptiScan II system.

Connecting your system:

1 Switch off the ProScan or OptiScan II controller.

2. Connect Filter Wheel, Shutter port and Lamp ON/OFF (Optional) on the Lumen to the Filter 1 and Filter 2 and Shutter port on the ProScan or OptiScan II system using the cables provided.

    a. It is not important which Filter connections are used on the Controller, but this should be noted for use with the command set described below, and for any 3rd party software .

    b. Tighten the screws to fix the cables in position.

3. Switch on the Controller, your Lumen200Pro is now ready to accept commands.

    a. It is not necessary to switch the Lumen200Pro power on to control the Shutter and Filter Wheel, these are powered by the attached controller.

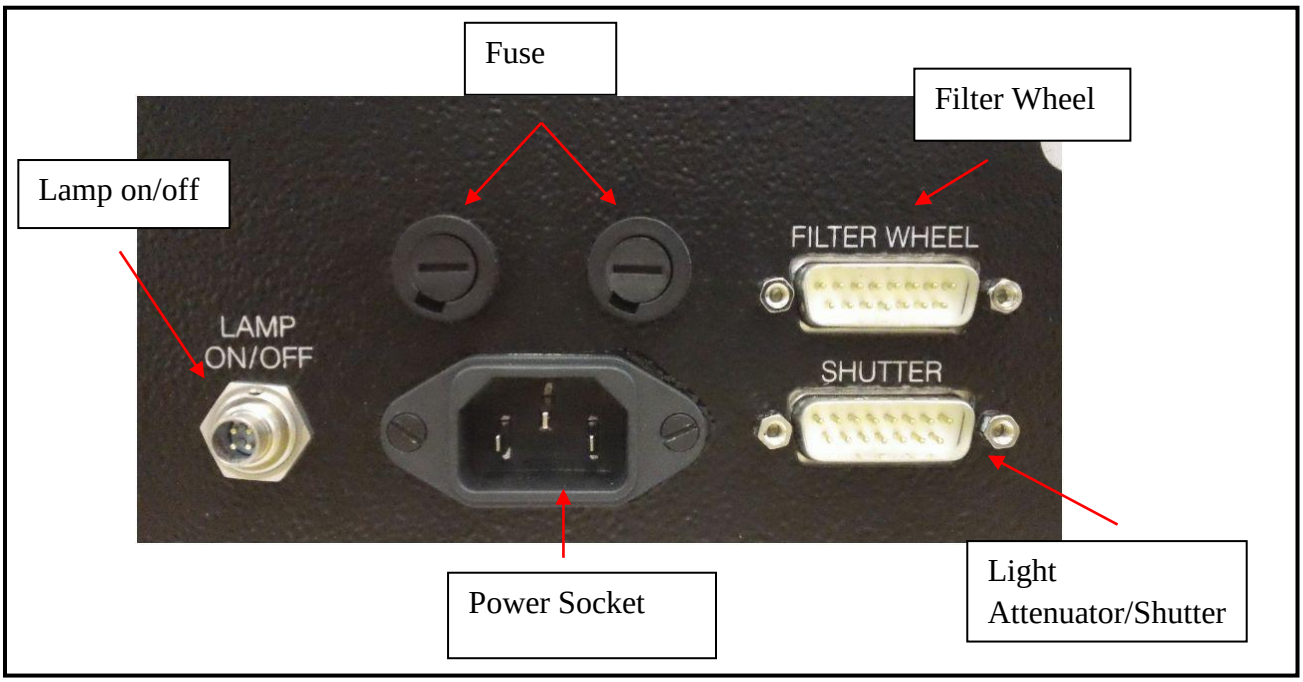


Fig 31 - Controller attachments for Lumen 200Pro.

5.2.4 Connecting your Lumen 200Pro to Prior PCI controller

The Lumen200Pro requires two filter wheel connections to a Prior PCI system.

Connecting your system:

1. Switch off the PCI controller/computer.
2. Connect the Attenuator/shutter to “FILTER 1” using the cables provided.
    a. Tighten the screws to fix the cables in position.
3. Connect the Filter Wheel to “FILTER 2” using the cables provided.
    a. Tighten the screws to fix the cables in position.
4. Connect lamp ON/OFF to “Shutter 1” connection using cable provided, (Optional).
    a. If connected lamp default to OFF.
5. Switch on the controller and computer, your Lumen200Pro is now ready to accept commands.
    a. It is not necessary to switch the Lumen200Pro power on to control the Shutter and Filter Wheel, these are powered by the attached controller.

5.3 Changing Filters in the Filter Wheel

The filter wheel can hold up to 6, 25mm filters; these are held in position using the standard Prior locking ring.

Changing a Filter:

Equipment required: *Lumen200Pro, Filter, Prior Filter block tool, flat head screw driver.*

1. Disconnect the Lumen from mains power and from the controller.
2. Ensure the unit has been allowed to cool for 30mins.
3. Place the unit on a flat surface with empty space in front of the unit.
4. Unscrew the 3 screws as indicated in Fig. 32

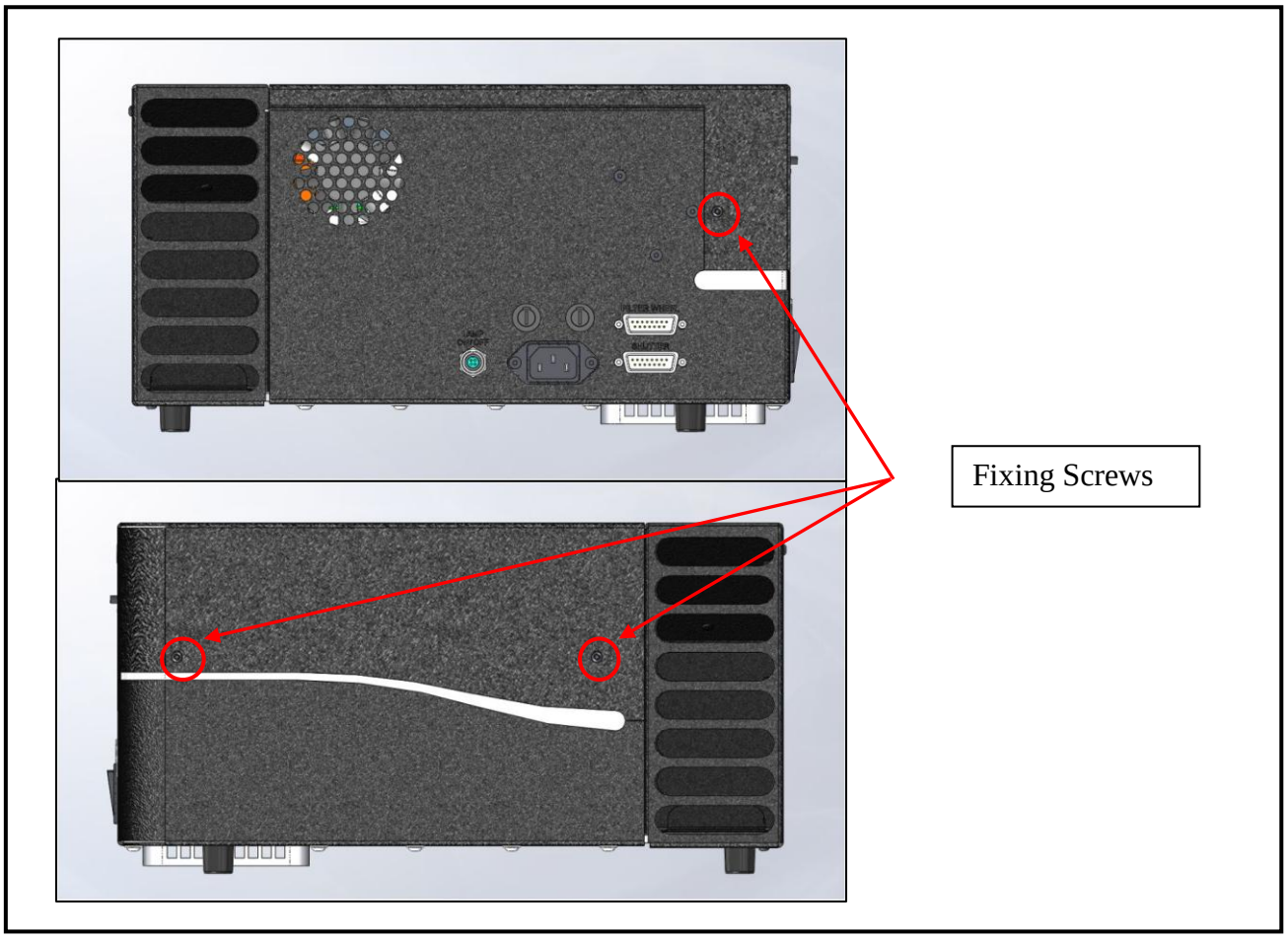


Fig 32 – The Lumen200

5. Lift the top of the unit, applying particular pressure to the front right corner to disconnect the internal connector. See Fig 32.

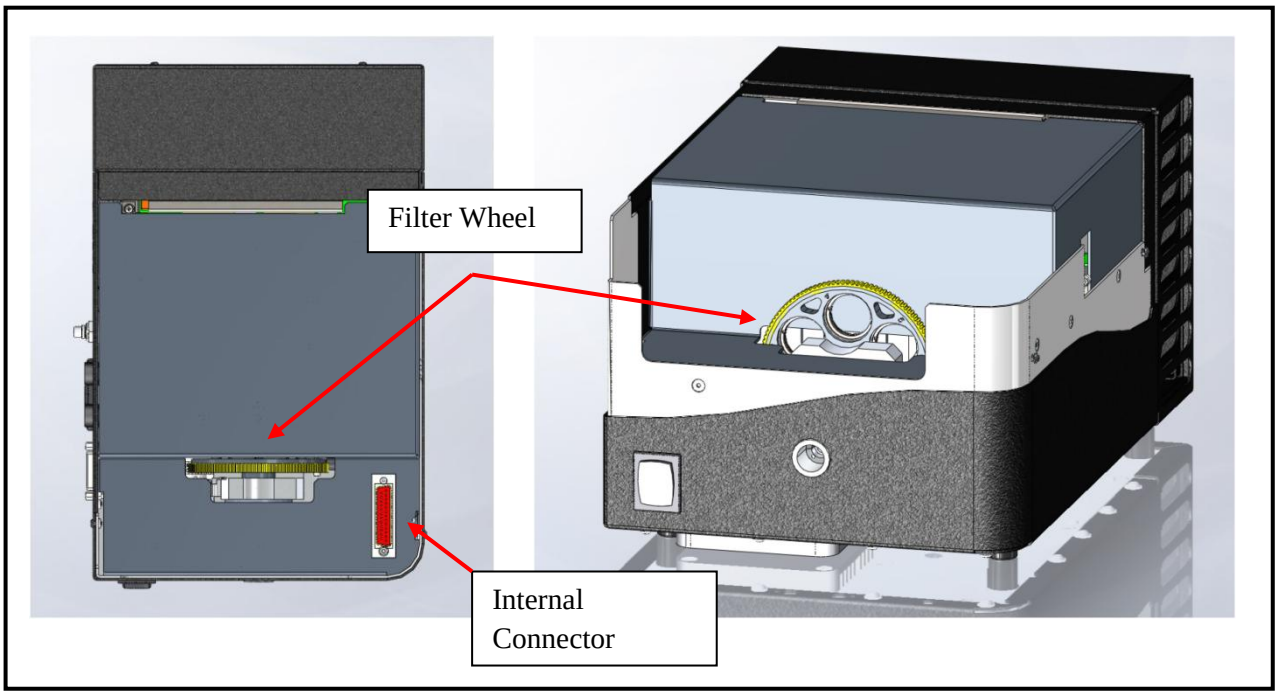


Fig 33 – The LumenPro200 Filter Wheel Compartment

It is important to try and lift the cover from the Lumen200Pro as straight up as possible. This makes it easier to replace as it minimizes the stress on the internal connector.

6. Turn the filter wheel until the desired filter position is reached. The filter position is indicated in by the filter number which is displayed on the top left of the filter hole. (Fig 34)

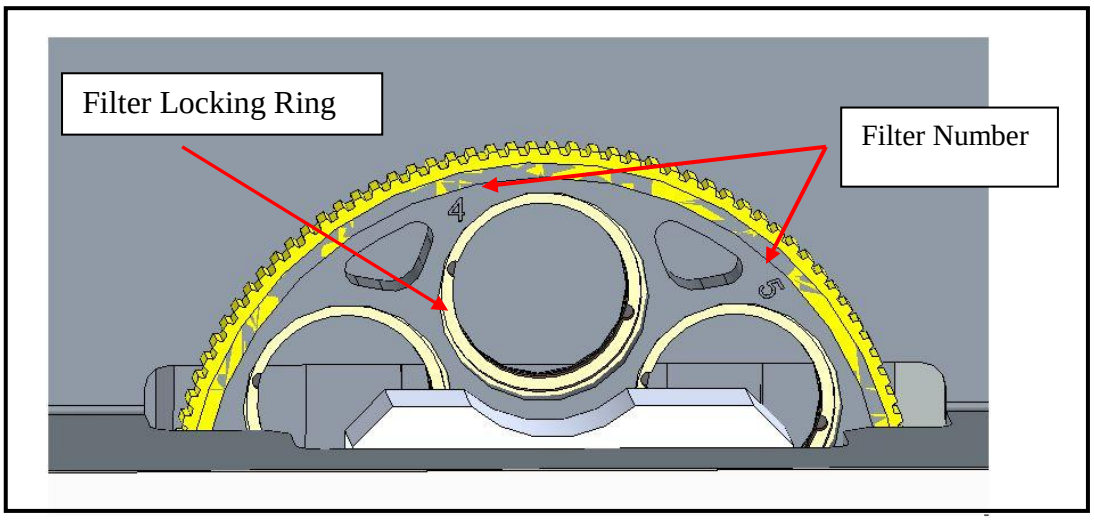


Fig 34 – The LumenPro200 Filter Wheel

7. Using the Prior Filter block tool unscrew the filter ring, making sure to locate the two lugs in the filter block tool into the two holes of the filter ring.
8. Remove the old filter; replace the new filter taking care not to place finger prints on the filter.
9. Using the Prior Filter block tool screw the filter ring to hold the filter. Be careful; not to over tighten the filter ring; some filters will expand when heated by the light.
10. Repeat for all required filters. Remember to record the position of each filter for use with your software.
11. Replace top of unit, ensuring the internal connector is aligned and replace screws.
12. Reconnect controller, check that the filter wheel is moving.
13. Reconnect Lumen200Pro mains power.

Starting Up the Lumen200Pro

Warning:

- **Do not power up the lumen without the light guide attached to both the Lumen200Pro and microscope.**
- **Only power up the Lumen200Pro when it is installed on a level surface.**

1 Ensure the light guide is attached to both the Lumen200Pro and microscope.

2 Connect the power cable to the Lumen200Pro.

3 Switch the Lumen200Pro power switch on.

4 Allow approximately 5 minutes for light to reach operational temperature.

5 **Do not** power down the unit within 10 mins of power up. This may reduce the effective lifetime of the bulb.

5.4 Working with the Lumen 200Pro

The Lumen200Pro can be controlled manually with the use of the PS3J100 interactive control centre and a Proscan III controller. Alternatively it can be controlled via software with either a Proscan or Optiscan controller.

5.4.1 Using a Lumen200Pro as a standalone light source

It is not possible to use the Lumen200Pro as a standalone light source without a Prior controller.

5.4.3 Using a Lumen200Pro with PC and OptiScan/ProScan Controllers

The Lumen200Pro can be controlled via the OptiScan / Proscan controllers using a standard Prior filter wheel and shutter cables. See section 5.2.2 Connecting your Lumen200Pro to an Optiscan or Proscan system.

On ProscanIII system the filterwheel and light attenuation (shuttering) can be controlled manually via the PS3J100 interactive control center, or with software commands.

On ProscanII and Optiscan II system the light attenuation (shuttering) can only be controlled via software commands.

If you use the Lamp ON/OFF connector to turn off the bulb after experiments the Lumen200Pro can only be turned back on by turning the mains switch OFF and ON again.

5.5 Shutting down the Lumen200Pro

The following warnings apply as damage to the bulb may result if instructions not followed.

Warning: Do not shut the unit down within 10 minutes of powering up the unit.

Warning: After shutting down the unit, allow 10 minutes before re-powering up or changing the bulb. Failure to do so is likely to result in damage to the bulb.

5.6 When to Change the bulb

The Lumen200Pro Bulb is installed with a timer chip which counts the hours that specific bulb has been activated. Once the bulb reaches the recommended lifetime of 2000 hours, an alarm will sound on the lumen. It is recommended that the bulb is changed at this point.

This alarm can be silenced using the button situated to the left of the display panel on the front of the Lumen200Pro. Once a bulb has reach 2000 hours the alarm will sound on power up of the Lumen until the bulb is changed.

6.3 RS232 Command Set

A description of how to connect to the ProScan or OptiScan systems is supplied in the OptiScan II and ProScan II manual. The following is the RS232 commands applicable to the Lumen 200Pro.

General Commands for identifying the Lumen200Pro.

Identify which Filter Wheel port the Shutter and Filter Wheel are connected to using the "?" command described below.

Command	Arguments	Response (All end with <cr>)	Description
$	a	decimal number	Reports status as a decimal number and gives motion status of the Filter Wheel or Shutter of the Lumen Attached to the controller. After binary conversion convention is as follows:- F2 F1 A Z Y X D05 D04 D03 D02 D01 D00 Parameters "$,a" where a is the axis or resource F - Filter wheels F1 - Filter wheel 1 F2 - Filter wheel 2 When the optional parameter is used the binary word is just for the axis requested. F is for filters (both Filter Wheel and Shutter) and would return 0 to 3 depending on if they are in use.

?	None	Text string	Reports information about the peripherals currently connected to the controller. The information end is always a line saying END This allows for the addition of extra fields of information without effecting application software. Users should always read lines in until the END is seen. A typical response is shown below OPTISCAN INFORMATION DRIVE CHIPS 11111 JOYSTICK ACTIVE STAGE = NONE FOCUS = NONE FILTER_1 = LLG_SHUTTER FILTER_2 = LLG_FILTER SHUTTERS = 000 END

The filter wheel installed in the Lumen Pro accepts the following commands.

Command	Arguments	Response (All end with <cr>)	Description
7	w, f	if f = F the current filter else R If no wheel is fitted E,17 will be returned.	If f is a number move filter wheel w to filter position f. if f is a 'N' move filter wheel w to next filter. If f is a 'P' move filter wheel w to previous filter. If f is a 'F' report current filter on filter wheel w. if f is a 'H' performs a home routine. If f is 'A' wheel will auto home on controller startup If f is 'D' wheel will NOT auto home on startup (default)
FILTER	w	Text string	Prints information about filter wheel w. The information end is always a line saying END This allows for the addition of extra fields of information without effecting application software. Users should always read lines in until the END is seen to keep in order to maintain compatibility. Example FILTER_1 = LLG_FILTER TYPE = 3 PULSES PER REV = 262500 FILTERS PER WHEEL = 6 OFFSET = 223500 HOME AT STARTUP = FALSE END
FPW	w	n	Reports the number n of filters on wheel 'w'.
SAF	w	a	Report the current filter wheel w acceleration setting.
SAF	w, a	0	Sets the current filter wheel w, acceleration to a. Range is 4 to 100
SMF	w	m	Report the current filter wheel w maximum speed setting m
SMF	w, m	0	Sets the current filter wheel w maximum speed to m. Range is 1 to 100

Lumen 200Pro Standard Shutter Commands.

The Lumen 200Pro Shutter accepts the standard commands for a Filter Wheel, Position 1-10 provide a standard range of light output from 0-100%.

Command	Arguments	Response (All end with <cr>)	Description
7	w, f	if f = F the current filter else R If no wheel is fitted E,17 will be returned.	If f is a number move filter wheel w to filter position f. if f is a 'N' move filter wheel w to next filter. If f is a 'P' move filter wheel w to previous filter. If f is a 'F' report current filter on filter wheel w. if f is a 'H' performs a home routine. If f is 'A' wheel will auto home on controller startup If f is 'D' wheel will NOT auto home on startup (default)
FILTER	w	Text string	Prints information about filter wheel w. The information end is always a line saying END This allows for the addition of extra fields of information without effecting application software. Users should always read lines in until the END is seen to keep in order to maintain compatibility. Example FILTER_1 = LLG_SHUTTER TYPE = 3 PULSES PER REV = 262500 FILTERS PER WHEEL = 10 OFFSET = 223500 HOME AT STARTUP = FALSE END
FPW	w	n	Reports the number n of filters on wheel 'w'.
SAF	w	a	Report the current filter wheel w acceleration setting.
SAF	w, a	0	Sets the current filter wheel w, acceleration to a. Range is 4 to 100

SMF	w	m	Report the current filter wheel w maximum speed setting m
SMF	w, m	0	Sets the current filter wheel w maximum speed to m. Range is 1 to 100
Command	Arguments	Response (All end with <cr>)	Description

The following are a list of commands specific to the Lumen 200Pro.

Command	Arguments	Response (All end with <cr>)	Description
LIGHT		a	Reports a the output of light from the shutter in %. The command automatically locates LGG_SHUTTER. (Liquid Light Guide Shutter) Error 20 reported if no shutter detected.
LIGHT	n	0	Sets the output from the shutter to n, where n can be set between 1-100%. The command automatically locates LGG_SHUTTER. (Liquid Light Guide Shutter) If n is "h" the shutter will perform a home routine.
LIGHT	P,n	0	Sets the filter wheel position P to n % light output. i.e., LIGHT,4,45 Sets position 4 to 45% light output. Use 7,n,4 to move filter to position 4, where n is the Filter Wheel port which the shutter is attached. STANDARD 10 Position Shutter settings are: Position % Light output 1 0 2 11 3 22 4 33 5 44 6 55 7 66 8 77 9 88 10 100
LIGHT	P, ?	n	Reports n, the %output of position p.

6.1.1 Error Codes

If a command is not valid a response of "E,n" is returned the n specifying an error type as listed below.

Machine or human readable messages are chosen using the **ERROR** Command.

ERROR CODE	ERROR DESCRIPTION
1	NO STAGE
2	NOT IDLE
3	NO DRIVE
4	STRING PARSE
5	COMMAND NOT FOUND
6	INVALID SHUTTER
7	NO FOCUS
8	VALUE OUT OF RANGE
9	INVALID WHEEL
10	ARG1 OUT OF RANGE
11	ARG2 OUT OF RANGE
12	ARG3 OUT OF RANGE
13	ARG4 OUT OF RANGE
14	ARG5 OUT OF RANGE
15	ARG6 OUT OF RANGE
16	INCORRECT STATE
17	WHEEL NOT FITTED
18	QUEUE FULL
19	COMPATIBILITY MODE SET
20	SHUTTER NOT FITTED
21	INVALID CHECKSUM
60	ENCODER ERROR
61	ENCODER RUN OFF

SECTION 7 TROUBLESHOOTING

7.1 Alarms and Warnings

The Lumen may display several warnings the following table explains the actions recommended on hearing an alarm.

Message	Alarm reason	Quiet Alarm	Actions
Bulb Fault 1	Software not recognising hr count from bulb	No	Switch off unit. Check bulb for damage and check data connector is securely inserted into its socket on the bulb PCB. (refer to Fig 7 page 15).
Over Temp Fault	Bulb over temperature	Yes, Hold button for 5-10s Reset to clear alarm	Check vents at rear of unit are not blocked or covered.
Under Temp Fault	Bulb area under temperature	No	Check unit is above 10^{o}C, contact Prior.
CHANGE BULB	Bulb reach 2000hr lifetime limit	Yes, Hold button for 5-10s	Change bulb.

7.2 Troubleshooting

Problem: On initial start up, no light output from Lumen200 / S / Pro.

Suggested Solutions:

- Confirm unit is plugged in and there are no error codes on front display.
- Confirm that the light output knob is not rotated to the 0% position (Lumen200 & Lumen200S).
- Check shutter position (Lumen200S & Lumen200PRO only) position to confirm if it is in the fully closed position.

  Lumen200S – Look at the LED display on the front of the Lumen200S check the condition. S – reports shutter is CLOSED; O – reports shutter is OPEN.

  Lumen200Pro - This can be done by sending the "LIGHT" command in HyperTerminal. See ProScan, OptiScan or PriorPCI manual for instructions on using "HyperTerminal".
- Send "HOME" command to filter wheel (L200PRO only) to insure it is not obstructing the optical path. Confirm that filter position in the light path does not contain a blanking plate.

Problem: On initial start up, illumination is not bright.

Suggested Solutions:

- The unit requires 5 mins to warm up and 15-30mins to reach full brightness.
- Check that Liquid Light Guide is installed correctly, see section 4 for installation instructions.
- Check that bulb is installed correctly. Check the appropriate installation instructions for the device you have. (Note, you must wait 30 minutes after shutting off the illuminator before opening the access panel.)

Problem: Just changed bulb and light is significantly less than normal.

Suggested Solutions:

- Check that bulb is installed correctly. Check the appropriate installation instructions for the device you have.. (Note, you must wait 30 minutes after shutting off the illuminator before opening the access panel.)

Problem: Just changed bulb and alarm sounds continuously.

Suggested Solution:

- Check for error messages on display.
- Turn off L200 / S / Pro and confirm that the Data Connector is installed completely into the PCB located at the base of the bulb. See section 4.1.

Problem: Alarm sounds every time Lumen200 /S /Pro is turned on.

Suggested Solution:

- Check display on front of Lumen200 /S /Pro for error message. Check to see if the bulb has exceeded the recommended lifetime.
- Check the display on the front of the Lumen200 /S /Pro for error message. Check to see if fan vents are covered or blocked.

Problem: Either Filter Wheel or Light Attenuator will not operate.

Suggested Solution:

- Confirm that the D-connectors on the side of the Lumen are connected securely into the filter wheel ports of a Prior ProScan, PCI or OptiScan controller.
- Check your Controller for error messages.

Problem: Non Passive failure of the bulb.

Recommended procedure:

If your company has a mercury spill procedure, that will take precedent over this document.

In the rare event that a Lumen mercury lamp breaks, the following action should be taken:

- All personnel should evacuate the room.
- Turn off any air recirculating equipment such as air conditioning.
- Open windows to ventilate the room for 30 minutes.
- Wear nitrile/latex gloves to carry out this procedure.

- If the breakage has occurred within the unit:
    - Disconnect the unit from the mains supply.
    - Once the lamp house has cooled, open the cover and, using protective gloves, remove the bulk of the lamp.
    - Place the lamp in it's box.
    - Carefully remove any shards of glass from the lamp house area and place them in the lamp box.
    - In the unlikely event of mercury being visible in the unit, it can be removed using a pipette (automatic or 'dropper bottle', NOT a mouth suction type) and placed in a sealed container such as a small capped glass bottle.
    - Clean up any remaining small particles of glass using duct tape or similar.
    - Remove the rear cover and treat this area as per the lamp house.
    - Place the lamp box and any container used for the spilled mercury in a polythene bag.
    - Remove the foam air filters from the rear cover and place them in the bag with the box.
    - The lamp house and rear of the unit should then be wiped down with damp paper towels or similar.
    - Place the towels and any container used in the polythene bag and seal it.
    - Place the first bag in second polythene bag and seal it.
    - Pack the bag in a cardboard box and return it to Prior Scientific Instruments Ltd for disposal.
    - Fit new filters to the rear cover.
    - Refit the rear cover.
- If the breakage has occurred outside the unit:
    - If only the reflector is damaged and the bulb at the centre is intact then the lamp can be treated as broken glass and along with any shards, using appropriate care, should be packed in it's box.
    - If the bulb at the centre of the reflector is broken then mercury will have been released. Use the same procedure for evacuation, ventilation and clean-up as detailed above to package the lamp remains and clean up the effected area.
    - In either case, returned the lamp to Prior Scientific Instruments Ltd for disposal.

SECTION 8 REPLACEMENT PARTS

Description	Part Number
Prior Bulb	LM200B1-A
Fuse	W3814
Liquid Light Guide	LM587
Filter Wheel Cable	HF300
Filter Changing Tool	LM589

Adapters

Olympus Adaptor (BX series)	LM10OL
Olympus Adaptor (IX series)	LM10IX
Zeiss Adaptor (Axio series)	LM10ZS
Zeiss Adaptor (Axiovert 25/40 series)	LM10Z25
Nikon Adaptor	LM10NI
Leica Adaptor (DM series)	LM10LC
Leica Adaptor (Stereo series)	LM10LS
Motic Adaptor	LM10MT

SECTION 9 RETURNS AND REPAIRS

Should you experience problems with your Lumen System and want to send it back for service, warranty or otherwise, a Return Material Authorisation (RMA) number must be obtained from the appropriate Prior Scientific office before returning any equipment.

For North and South America contact Prior Scientific Inc., for Japan contact Prior KK, for Germany, Austria and Switzerland contact Prior GmbH and for the all other countries contact Prior Scientific Instruments Limited on the telephone numbers shown below.

Prior Scientific Instruments Ltd,
Unit 4,
Wilbraham Road,
Fulbourn,
Cambridge,
ENGLAND,
CB1 5ET
Tel: 01223 881711
Fax: 01223 881710
email: uksales@prior.com

Prior Scientific Inc.
80 Reservoir Park Drive,
Rockland,
MA 02370-1062
USA
Tel: 781 878 8442
Fax: 781 878 8736
email: info@prior.com

Prior Scientific GmbH
Wildenbruchstr. 15
D-07745
Jena
GERMANY
Tel: +49 (0)3641 675 650
Fax: +44 (0)3641 675 651
email: jena@prior.com

Prior Scientific KK
Kayabacho 3rd Nagaoka Bldg 10F
2-7-10, Nihonbashi Kayabacho
Chuo-Ku
Tokyo
103-0025
JAPAN
Tel: +81 (0) 3 5652 8831
Fax: +81 (0) 3 5652 8832
email: info-japan@prior.com